

# AVIATION WEEK

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FEB. 8, 1954

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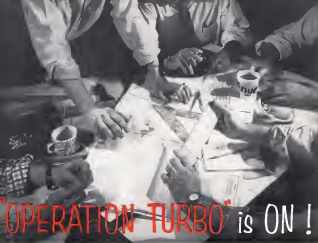
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## Douglas F4D Skyray

Breaking each mile in less than 5 seconds, during four passes of a 3.6-kilometer course, a Douglas F4D Skyray shattered the official world speed record in the United States.

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by an even wider margin. Now in production for the Navy, this delta wing jet conceals a wide turbine duct and a jet-pipe to its open-plus the use of banking instead of curved bankings. The Douglas F4D Skyray has now passed its initial carrier tests, its service will guard

our fleets against the threat of modern jet bombers.

Performance of the Navy's F4D Skyray is another example of Douglas leadership in aviation. Faster and farther with a larger payload it always the basic role of Douglas design.



As a Naval fighter—see the U.S. Navy's Skyray Feb. 10, 1964

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First in Aviation

## Domestic

First C-124B, helicopter version of the Douglas Globemaster, completed its initial flight last week, taking off from Long Beach, Calif., and landing at Edwards AFB for start of test program. The C-124B is powered by four Pratt & Whitney Aircraft TF34-P-1s, capable of developing equivalent of 5,500 hp each in takeoff and giving the transport 66% more power than the conventional Globemaster.

Third major aircraft carrier will be built for Navy by Newport News Shipbuilding & Dry Dock Co. of Virginia, awarded the contract last week, on a fixed-price bid of \$117,790,000. Total estimated total cost of the 68,000-ton ship: \$112 million. This compares with \$216 million for the Forrestal and \$213.5 million for the Saratoga.

Flying Tiger Line pilots, represented by ALTA, and Siksk Airways Pilot Assn. have signed an agreement for integration of their security lists, clearing the way for CAB approved merger of FTL and Siksk and ending a four-week dispute between the two carriers (Aviation Week Feb. 1, p. 77).

Jet-powered F2V-3 is in full production at Lockheed Aircraft Corp.'s Burbank (Calif.) plant under a new Navy contract. Prototype submarine killer has two Westinghouse J56s installed in wing pods (see p. 7), supplementing two Wright-Turbo Compound propellers.

Pan American World Airways has become the first airline to put Sabel (selective radio ending system) into operational use. The new system—developed by Motorola and tested in PAW for 25 months—enables ground air crew controllers to contact transports, freeing phase crews from continuous radio in listening.

Robert L. Bouy, former chief of National Bureau of Standards, Project Tinker (aerodynamic factory), shortly will join American Cor. & Foundry's new Electronics Division. The appointment is further evidence of ACF's interest in setting up a Tinker-type place (Aviation Week Feb. 1, p. 11).

La. Coast George W. Fier is now technical information officer for Navy's Bureau of Aeronautics, replacing Lt. Col. Fredrick M. Lloyd, who is leaving after two and a half years in the post to attend the Naval Postgraduate School at Monterey, Va.

## NEWS DIGEST



### Latest Portrait of U.S. Research Configuration

Seven Air Force, Navy and NASA research planes present a variety of configurations in this group picture taken at the USAF Flight Test Center, Edwards AFB, Calif., where the craft are being flown to gather data for future designs. In center is a medium-sized, jet-powered Douglas X-3, designed for sustained flight at high speeds. Beginning at the left, clockwise: Bell X-1A rocket plane, which has flown more than 1,000 mph; jet-powered Douglas D-558-3 Skyhawk (now under development); jet-powered Douglas D-558-2 Skyhawk (which has reached a speed of 3,000 mph); and the little new jet Northrop X-45, which explores stability and flight characteristics of supersonic configurations at transonic speeds.

Cock headings will be held by CAB at Silverport, La. Feb. 10 in an effort to determine why a Grumman Mallard plunged into a lake three years after it was built. John B. Smith, senior pilot-in-command, is being held by the FAA. (Aviation Week Jan. 15, p. 20).

Porter Douglas B-47s of Strategic Air Command's 7th Bombardment Group, based at Barksdale AFB, La., to a French Fifth Air Division base in France. Missions for full day of operations. The B-47s will be used in flight from Barksdale KC-135 tankers.

Charles C. Hildner, Jr., vice president of the Air Transport Assn., died last week at Bethesda, Md. (see p. 11).

## Financial

Grumman Aircraft Engineering Corp., Bethpage, N. Y., reports record profit margin of 37.25% in 1963, compared with 35.5% in 1962 and the wartime peak of 39.1% in 1945.

1964 sales and other income totaled \$241,074,150, an increase of \$10,364,479 over last year.

## International

The Handless Comet 2 has flown from Khartoum, Sudan, to Johannesburg, South Africa, in 6 hr. 17 min., averaging 660 mph on the 2,913-mile route. Company officials are confident of the jet transport's long hoped-for test and the London-Khartoum flight last month (Aviation Week Feb. 1, p. 16). The jet is expected to be in service by the end of 1964. The Comet 2 completed the London-Khartoum flight with sufficient fuel in its tanks for a 600-mi detour and a 15-min. holding at an alternate stop.

Japan Air Lines has inaugurated twice-weekly, 24-hr. scheduled DC-60 passenger service Tokyo-Sao Paulo, Japan to start Comet 2 flights weekly around Tokyo-London and Tokyo-Sao Paulo early next summer.

## ELEVATOR FEEL TRIM

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February 8, 1954

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## THIRD INTERNATIONAL AVIATION TRADE SHOW MAY 5, 6, 7, 1954

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NUFTONE DOES 200 MPH. WITH PROPS FEATHERED—Steady view of Lockheed P-5V, with an engine 3,400-hp thrust Washington 104 under test wing. Being at 200 mph, indicated speed on giv with prop of Wright Turbine Compressor locked.

## New U.S. Aircraft and Missile Developments



NO FUTURE FOR T-36—Despite reports that Canada is studying the market for a commercial version of the B-36, plans to produce the T-36A immediately after USAF test year started B-36 and Canada contract for a large number of the planes.

CARRIER LAUNCHES REGULUS MISSILE—Chase Wright Regulus nuclear-torpedo missile takes off from the deck of USS *Parade* (below left) with aid of rocket launchers. Launching setup for missile in detail (below right) prior to firing.



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## In the Front Office

Harry A. Brown has been elected president of H. A. Brown & Associates, newly reorganized public relations firm in New York. Kenneth D. Calogian is executive vice president and William Phillips and Thomas Wright are vice presidents.

William Haddad and Hanson Gault, founders of Pacific Scientific Co., have retired from active duties with the Los Angeles organization. Other changes: Howard D. Kase, chairman; Edgar P. Clark, secretary.

Curt W. Schuman and Joseph J. Mehl have established Tech-Fabric Corp. at Newport Beach, Calif., in distribution of U. S. and Swedish precision machine tools in 11 system states.

Paul H. Fry has been appointed vice president engineering of National Co., Melrose, Mass.

Edward J. Fritz has been elected first vice president and John S. Gorski is new second vice president of Anco Gage Co., Detroit.

Robert W. Foxworth, president of Flying Tiger Line, has been elected a director of Southwest Bank of Longwood, Calif.

## Changes

Dr. E. R. Strohman, longer chief of the engineering section of National Bureau of Standards, has been named chief of the new fluid mechanics section.

Bert Gato, Frederick R. Butler (USA Ret.) has been appointed manager of San Francisco Airport, succeeding George M. Davis, who resigned to enter private industry.

Alvin Chilton is new chief engineer for Westinghouse Electric Corp.'s Western Gas Turbine Division, Philadelphia.

Martin V. Kachner, technical chief of Navy Bureau of Aeronautics guided missile branch, is new chief engineer of the Test Division of P. R. Mallory & Co., Indianapolis.

Vincent J. Cushing has been promoted to assistant manager of the production and structural research department of Avionics Research Foundation at Illinois Institute of Technology, Chicago. Francis B. Fennel has been appointed senior research engineer. Col. Paul H. Komer (USAF Ret.) has become chief designer at Ryan Aircraft Test Co.'s Flight Division at San Diego.

## Honors and Elections

James H. Knudsen, board chairman of North American Aviation, has received 19th Century Aviation Award, the Order of St. Merite de la République Italienne, for his outstanding achievement in the aeronautical field.

Arthur F. Mansueti, vice president in charge of American Airlines, is new president of the American Aeronautical Society.

C. D. Butler, general manager at McDonnell Manufacturing Co., has been elected as president of the Personnel and Industrial Relations Assn. of Los Angeles.

## INDUSTRY OBSERVER

While other airlines have been expending interest in buying 15-passenger Sikorsky S-56 twin-engine helicopters, National Airlines has stepped in with an option for the last contractual delivery. Los Angeles Airlines and Sabena bought National Airlines also are negotiating for the S-56.

Trans-Canada Airlines is interested in buying three Vickers Viscount turboprops, says president G. Roy Clark, who visited Britain recently.

Professor Fred Heesler's first postwar aircraft, a trainer, is ready to be built as soon as the first prototype. Heesler also is preparing to do work on supplying aircraft parts for USAF planes operating from Germany.

Vickers has come up with a new advanced version of the Viscount that will support its six-engine plan for the Model 800. The new Model 800 will have a 69,000-lb. gross, 56-to 82-passenger capacity and a range up to 900 mi. Rolls-Royce Dart turboprops for the 802 are scheduled to provide a 350-mph cruising speed with a 10% fuel reduction over earlier types.

Sikorsky Aircraft Division has won three 20-hp. ground and flight test cases on its S-52 four-place helicopter powered by a French-built Turbomeca Atom 2 gas turbine. Powerplant is mounted on top of fuselage at base of rotor head, weighs about the same as the rotor transmission and develops 500 hp. for itself. A new four-blade rotor replaces the original three-blade unit.

Stanley engineers have developed small hydraulic motors to drive the retractable wheels of their big 18425 Minuteman cargo for carrier dock handling. Unit is quickly detachable, operates from main hydraulic system driven by carrier power supply.

Highly flexible steel rotors have been developed for rate chute descent used in cargo drops or airtail recovery. Rotors are rolled in opposite direction into 19-in. diameter cylinders to save space, and unrolled as chute from carrier aircraft.

New graphic display for showing aircraft traffic flow, aimed at eliminating off-schedule flight program strips used by air route traffic controllers, has resulted from an Air Transport Association study. ATN's Sam Stuart, who originated the idea before the Institute of the Aeronautical Sciences' recent convention, says it will be submitted to Air Consulting Committee for further study; emphasizes that plan is not an official AIA proposal. New display technique involves use of a fixed-block system instead of present moving block, which some observers feel is an obstacle to its adoption.

Chance Vought's new Navy day fighter will be designated the F11, according to H. M. Thomas, chairman of the board of the newly organized Chance Vought Aircraft, Inc. This is the carrier-based fighter with a variable-sweep wing with which Vought won a Navy competition last summer when it was still a division of United Aircraft Corp.

Bellah, Grumman Aircraft Controls are not scheduled to return to regular service to the immediate future. Investigation of the Comet crash over Ellis has not uncovered any promising leads yet. Possibility of an explosion in the fuselage fuel tank has been ruled out as a possible cause of the Comet crash near Gibraltar. The fuselage cell type fuel tank was removed intact from the Gibraltar wreckage.

Douglas engineer Carlos Wood, chief of preliminary design, recently received WASHINGTON WEEK report (Oct. 10, p. 11) that Douglas has engineered a design for a later version of its DC-7 transport but has not yet made a decision to build a prototype.

McDonnell Douglas (F111N) all-weather, carrier-based interceptor carries a high percentage of its fuel internally. Armament consists of 20 cannons and externally wing rockets. Down has an allowable "idle" fuel for control at the high Mach numbers of its operational speed range.

## USAF Reshuffle

A major reshuffle of top USAF commanders is under way in the Pentagon, but no public announcement of the changes is expected until spring.

Regard this probably will see Gen. Curtis E. LeMay, Strategic Air Command boss since 1948, move to Tokyo in favor of the First Air Air Command. Gen. Otto Weyland, now TAFI commander, is slated to go to Thirteenth Air Command and Lt. Gen. Earl (Pat) Partridge will come from his present post as Deputy USAF Chief of Staff for Operations to command SAC.

Lt. Gen. Cyril Cook, now Deputy USAF Chief of Staff for Material, is slated for a European assignment and Gen. Lucien Nafziger is expected to return from Europe to the Pentagon. Successor to Gen. Clark as military chief is still undecided, but current Pentagon odds favor Lt. Gen. Edward Ruskling to move to Hq. Air Materiel Command with Lt. Gen. Charles B. Weaver III, now USAF comptroller, scheduled to take over in Dayton.

Reshuffle was stimulated by scheduled retirement of Gen. Joseph Canine this spring, which will create a favorable vacancy that will probably go to Gen. Partridge when he takes over SAC.

## Report Screening

Two top secret military reports are being screened for material that can be released publicly. One is the crash site of the crashed missile program recently completed by a group headed by Trevor Gardner, USAF research expert. The Gardner group's report is being screened by Donald Quaid, Assistant Secretary for Defense in charge of research and development.

Second report is by Robert Synges, Monocentrics Weapons Development, on the air defense system for the North American continent. Synges' report was made to a subcommittee of the Senate Armed Services Committee in a recent Senate hearing recently. Subcommittee consisted of Sen. Everett McMillan, Styles Bridges and Richard Russell. McMillan and the report was "very accurate."

## Ryan to NACA

Appointment of Oswald Ryan, vice chairman of Civil Aeronautics Board, to the National Advisory Committee for Aeronautics was made possible on a public political endorsement of Ryan by the Eisenhower Administration.

Opportunity for Ryan's Presidential appointment was created by the resignation of Commerce Undersecretary Robert Meyer from NACA. CAB member Joseph Adams continues as an NACA member, making it the first time that two CAB members have served on the committee. Legal authorities for the NACA membership still are the outdated law "two members from the Civil Aeronautics Authority."

## CAA, CAB Reorganization

The Commission on Government Operations, headed by former President Herbert Hoover, has no plan for a combining of government agencies which would affect CAA or CAB. The commission has set up two task forces, whose findings will affect the two aviation agencies.

• The task force on personnel, headed by president

Herold Kibbles of Princeton University, is expected to establish which jobs should be taken out of Civil Service and made policy appointments. Robert Ransacker, vice president of Eastern Air Lines and formerly chairman of the Civil Service Commission, is a member of the group.

• The task force on legal procedures, headed by Judge James Douglas, formerly of the Missouri Supreme Court, is aiming to streamline CAB and other government procedures. James Landon, former CAB chairman, is a member of the group.

## Airline Subsidies: Early Test

Funds for airline subsidies have been brought out in Congress when the revenues-less House Appropriations Committee votes on this issue. After long consideration, the Commerce subcommittee has completed hearings on the fiscal 1955 budgets for Civil Aeronautics Administration and Civil Aeronautics Board. The subcommittee's chairman, Rep. Clark Cleveland, expects to have them under for House consideration before the end of the month.

Cleveland's position is that the appropriations group has no authority to free down funds for airline subsidies unless they are accompanied with the law authorizing them. His comment: "We are not a legislative committee and cannot legislate on whether there should or shouldn't be subsidies."

## Uneasy Air Truce

Recent destruction of a Meig 15 by Saboteur over the Yellow Sea off Northern Korea is an indication of the uneasy air truce hanging over both nations' personnel. Both the Saboteur formation carrying an RB-45 jet plus photo-reconnaissance plane and the Meig-15 formation carrying out from North Korea were over international waters.

Incident was triggered by a single Meig-15 leaving his formation to make a pass at the RB-45. The incident was promptly "adjusted" by the Saboteur before any drastic action on the RB-45. USAF plans to end duplicate operations over the incident and will remain satisfied with its military victory.

## Hughes in the News

Washington observers are puzzled over two recently published versions of Howard Hughes and his association with operations with Hughes Aircraft Co. One is a blistering account of Hughes' difficulties with his top scientists and management of the Hughes Aircraft Co. that threatened to disrupt operations of USAF missile systems and electronic for control systems for the Convair F-102 and other supersonic interceptors.

It appeared in the February issue of Fortune, written by Charles J. V. Murphy, who recently wrote a book on a USAF new front cultural and speech writer for Gen. Hoyt S. Vandenberg. Murphy's article concludes: "And even, to say the least, the question arises: Is there room in national defense work for a Howard Hughes?"

The other is a straitened biography of Hughes in Look magazine, describing him as an "enigma" whose ideas are embodied in every modern plane. Look also says "The aviation world increasingly looks like (Hughes) as a genius in aircraft design."

—Washington staff

# Supreme Court Jolts CAB Subsidy Policies

By Frank Bess, Jr.

A part of president-elect Dwight D. Eisenhower's decision against CAB subsidies Board and two airlines last week dealt heavy blows to combined domestic-international airline operations and future mergers and route sales.

The court ruled unanimously that: • Excess profits earned from domestic operations of an airline must be offset against its international subsidy requirements. This decision curbs the ability of Delta-Congress and Southern Airlines to claim a \$654,000 back and pay.

• Western Airlines' estimated \$1 million profit for sale to United for sale of its route for operations on Route 65 between Los Angeles and Denver must be treated as "all other revenue" at determining carrier's mail pay.

• First CAB loss-ledly decision but at least CAB policies and work the first time the Board has lost a case in the Supreme Court. The rulings uphold those made by the U. S. Court of Appeals last year.

In the Delta-CAB case, the court held that an airline's subsidy must be measured by the "entirety of its operations," that international and domestic operations cannot be considered as separate entities.

CAB believes the decision could result in:

- Necessity of reorganization of the entire international route system
- Division of international routes by domestic airlines
- Mail Pay—The \$654,000 Delta-CAB case involved subsidy mail pay for foreign operations of Chicago & Southern Airlines from 1946 to 1950, prior to merger with Delta.

In 1948, CAB, an application made by CAB in 1944 and 1945, filed a prospective annual subsidy for the airline's domestic operations beginning in 1948. While the Board estimated would yield a net return after taxes of 7.4% on that part of its investment available to those operations.

In the following three years, however, rates in question produced a subsidy

of more than \$654,000 in excess of 7.4% return.

• Retroactive Order—No 1946, CAB applied for subsidy and pay on its Latin American routes. CAB asked its order in October 1951, being retroactively applied from Nov. 1, 1946 to Dec. 31, 1950. The subsidy awarded was \$1 million. The court held that Delta had used for an additional \$654,000. The court and the Board merely concluded that excess domestic profits should not "be a matter of concern to the public," but that it is a matter in computing subsidy for international operations.

• The point, the decision of the Board seems not in accordance with the law. The decision emphasized that CAB had not said that Delta had used for an additional \$654,000. The court and the Board merely concluded that excess domestic profits should not "be a matter of concern to the public," but that it is a matter in computing subsidy for international operations.

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but that the net profit the initial question of whether the financial condition of the carrier as such that it needs a subsidy or has no need for one.

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## AF Cuts J65s to Buy F-100s

USAF has shifted procurement funds from buying 175 J65s to the Wright J65 factory to buy a lighter-bomber version of the supersonic North American B-70 Super Sabre.

- **North B-70, "Cansera"** Total of 12 of these aircraft were cut from the schedule.
- **Republic F-94F Thunderbolt** lighter bomber. Several hundred of these aircraft were canceled from production scheduled for General Aviation Plant, Fairford-Columbus dual purpose plant at Keesler City, Miss.
- **Wright J65 nuclear missile** to power the canceled B-70 and F-94F. Cansera-Wright J65, which will use the J65 engine.

Selection of a lighter bomber was

one of the 100 Super Sabre, powered by a Pratt & Whitney J65, the Wright J65 factory to buy a lighter-bomber version of the supersonic North American B-70 Super Sabre.

- **GM Phenom-USAF** says GM's Kenan City plant will be placed out of 1-8-68 production in the fall of 1955 is originally planned.
- **No employment changes** are contemplated at the General Motors plant in Kenan City, which is scheduled to be completed by the fall of 1955.
- **USAF** is studying possible future aircraft production plans for the plant after it completes the F-100.
- **USAF** is studying the quantity of B-70s scheduled to be produced at Republic Aviation's Farmingdale, N.Y., plant.

Delivered in December were 224 one- to 100 single and double place, at \$12,000,000, compared with 247 aircraft at \$2,510,000, during November.

## CAA Weighs Godfrey Version of Takeoff

Civil Aeronautics Administration's recommendations to the Arthur Godfrey one (AVIATION WEEK Feb. 3, p. 13) are being prepared in New York last week by S. W. Schickel, attorney for Region 1, following Godfrey's waiver of a Civil Aeronautics Board hearing.

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ABR INDUSTRIES will be moved to one tunnel-like from facility, now being built.

## New Tunnels Open to Industry

By Robert Blos

The aircraft industry will be offered an opportunity next year to do private preliminary research in the new super-sonic windtunnels now being completed by National Advisory Committee for Aeronautics under the major plan.

Dr. Hugh L. Dryden, NACA director, told AVIATION WEEK that these super-sonic research facilities covering speeds up to Mach 5 would begin to be used by the industry next year.

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The new facility will be a single tunnel with a 17-ft by 17-ft section covering a range from Mach 2.5 to 5.5. The super-sonic flow will have two circuits separated by a valve system.

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the use of its facilities by private industry for non-military work, but the heavy program of military projects has made it impossible to select any private base on non-military projects during the past 10 years.

• **Punch Through-Tunnel** The original 32-ft-tall plan was subsequently scaled down to about half by civilian NACA special committee on super-sonic facilities, headed by Dr. Jerome C. Hunsaker.

This plan included 16 small tunnels with 2-ft by 2-ft sections to be built at various sites, some super-sonic, some at NACA and Navy installations, the new USAF development facility now under construction at Tullahoma and creation of a new NACA super-sonic research center. This program was canceled by the new Research and Development Board of the Defense Department to a \$680-million total.

When the current plan finally was authorized as a legislative proposal to Congress in 1946, it had a total of \$213 million was approved for the following projects:

- **\$10 million** for six small tunnels, including the portion of the program has been authorized, canceled, or canceled.
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Off the program, \$75 million for the NACA tunnels now under construction and \$175 million for the Tullahoma tunnels have been appropriated.

## P&W Work Force Hits 35,000 Goal

Patterson and Whitney Aircraft's employment has reached the company's goal of 35,000, and more than half the original 1945 goal of 195,000.

A large part of the company's job output was in the 4000-hour 175, which first came into production in February 1953.

Other engines included 134 turboprop T34 turboprop and R3000 and the R2800 piston powerplants.

During the last year, P&W's turnover in its employment was an average of 100 percent. In June 1950, the firm's employees totaled 15,161. Present peak represents an increase of 130%.

Given any P&W's work is a position to reduce manufacturing costs by cutting overhead.

was of the owner for the industry," the court concluded, "and the effect of a policy on the industry."

## ANDB Holds First Policy-Level Meeting

An Navigation Development Board has held its first organizational meeting near the discussion in the meeting.

The new ANDB chairman is Donald Quillen, Assistant Secretary of Defense for Research and Development. Other members include William G. Smith, Assistant Secretary of the Navy for Air.

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FIRST PRODUCTION Twin Bonanza available to business flyers has 309,990 price tag



LATEST BONANZA with four and six seats for \$15,990 or \$18,990, depending on engine

## Beech Unveils 1954 Plane Stable

Beech Aircraft Corp. designs and distribution have taken a previous look at the new "Super 18" Twin Bonanza, which incorporates a number of engineering changes aimed at extending the life of the Model 18 business plane series, design a million-dollar "Flow-Ram" air ducts, Kan.

At the conclusion of the drawing, design phase from office for 15 of the new planes, valued at approximately \$1.5 million, and an additional \$4 million in contracts for 1954 single-engine Bonanzas and Twin Bonanzas.

Five features of the new Super 18, officially known as the E18S, are expected in June. Price \$95,575.

► **Increased Performance**—Important improvements in performance as a result of the many changes are noted by Beech, particularly increased cruising speed to 215 mph, and range to 1,415 mi. Top speed is 231 mph.

The plane's gross weight has been increased 550 lb. to a total of 3,900 lb. Empty weight with standard fuel and average engine equipment is 1,550 lb.

The engine, two Pratt & Whitney Aircraft R585-AN 140s, that deliver 450 takeoff horsepower at 2,300 rpm, have been fitted with exhaust supercharger stacks. Exhaust system properties have been modified.

► **Larger Wings**—Extensively one of the most noticeable changes from previous Model 18s are the wing structure. Wings have additional area and span. This change has lowered the plane's wing-loading, increased lift and angle of attack.

Landing and takeoff characteristics are improved, the company says, by lengthening the takeoff, stall and rising the level of the fuselage, giving the pilot added visibility while taxing.

► **Deeper Fuselage**—The fuselage has been made deeper, providing approximately four cubic more head room in the cabin. Number of windows on each side of the cabin has been increased from three to four, and each window has been deepened four inches—improving passenger visibility.

An important new feature in the construction does passenger step that can be lowered to provide easy exit and entry without need for a separate ladder. Step of the door has been enlarged.

Other features include an 80-gal. new tank as standard equipment (previously optional), separate compartment in the seat for radio equipment and a new construction type heater for the cabin, providing separate control for temperature before flight and as an optional feature for enroute engine.

► **New Twin Bonanza**—Second of the line of business planes, Beech is offering this time is the new 520 Twin Bonanza, of which more than 100 will be delivered in 1954, with pricing going to approximately 180 hours who placed first order for the plane early in 1951.

Three basic lines delivered and one more will leave the plant this month. Price is \$99,950, Wichita.

► **100 Changes**—Beech says more than 100 design and equipment changes mark the new E18S Twin Bonanza.

The six-place, powered by 360 hp

Lycoming GO-435 G30, has a cruising speed of 202 mph at 18,000 ft., a full gross load of 3,800 lb. is 200 lb. heavier than the earlier version.

Cruising range has been increased 180 mi. for a maximum of 1,085 mi. with six passengers and baggage. Rate of climb is 1,450 fpm., and service ceiling is 20,000 ft.

Among the design and equipment changes on additional new cabin window on each side, new construction-type 75,000-lb. tractor, which also has the optional engine-driven fuel system available on the E18S, selection of wingtips, and fitting of a non-mounted two light (500 cfm).

► **1954 Bonanza**—The new four-place E17 Bonanza, with the distinctive V-tail, this year is being offered with a choice of two engines: E185-11 Continental of 165 hp, which has been the standard powerplant on previous models, or the E175-1A Continental of 225 hp.

Top speed with the latter is 194 mph. With the latter it is 194 mph. Price of the 203 hp E18S is \$15,990. The 225-hp version is \$1,200 higher.

## ACC Asks Comments On Production Study

An Coordinating Committee has asked for comments from the aircraft manufacturing industry on the production study aimed to its air policy study (AVIATION WEEK Jan. 4, p. 12).

Deadline for the written comments is Feb. 10, but industry who wish to make personal presentations can do so later by special arrangement with ACC. The following points will be covered:

► **Research and development.**  
► **Procurement policy,** including maintenance of production base, distribution of procurement funds, widespread distribution of selected companies, subcontracting policies, secondary sources, administrative and contracting policies.  
► **On aircraft procurement,** development of standard modification plan and contractual framework prior to emergency long-term contracted planning, two limits on appropriations and with sales, ending of production contracts, profit margin allowable as government contracts, patent rights, production financing under procurement contracts.  
► **Government involvement,** similar facilities, including resource plans and economic tools records.

► **Business arrangements,** including, cooperation activities between culture, science and manufacturing industry and strategic materials availability.  
► **Other sources of support for industry,** including production and role of civil aircraft and equipment, and export sales of military aircraft and equipment.  
► **Security factors,** including dispersal of aircraft manufacturing facilities.



technical bulletin

# a New PILOT SEAT ACTUATOR

... that can be made to your exact specifications in

1. Length of stroke
2. Speed of stroke
3. Spread between jacks
4. Operating load
5. Mounting dimensions



## Electrical Engineering and Manufacturing Corp.

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Los Angeles 16, Calif.

Another new product from the design department of EEMCO is this pilot seat adjustment actuator that can be made to your exact specifications as listed above. With a weight of only 7 pounds, it will handle an operational load of 250 pounds and more. The compact control box, only 2 1/2" x 4 1/2" x 4 1/2" in size, contains the speed and powerful EEMCO motor driving the two jacks, as well as the clutch, brake, limit switch and safety interlock. The two jacks are coupled for synchronized movement. The actuator illustrated has the following specifications:

**Operating load:** 250 pounds  
**Weight required:** 25 oz. **Amperage:** 8.5  
**Stroke:** 4.835" **Speed of stroke:** 70" per second  
**Ultimate static tension load:** 6800 pounds  
**Ultimate static compression load:** 1200 pounds

## LEAR GIVES SURE CONTROL FOR COWL FLAPS ON CONVAIR 340

To MATCH its exceptional ability to "get up and go," the versatile Conair 340 needs precision control of its engine cowl flaps. Positive action and exact positioning for this important function are provided by Lear screwjacks.

Lear screwjacks form but one part of a comprehensive line of Lear electro-mechanical actuating products for aircraft use. These compact designs, light weight, high strength, and precision operation spell out the reasons for the use of Lear electro-mechanical products on almost every commercial and military aircraft flying today. Let us discuss your electro-mechanical problems. We will either have the answers on hand or be able to develop them quickly.

**LEAR MODEL 500 SCREWJACK** (shown above)  
Combines with these similar units to completely a positive, nonovercoming engine cowl flap control system for the Conair 340. The entire assembly is controlled by a common power source through a Lear system of flexible shafting, which can be utilized to transmit power to additional accessories.

D-4

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Executive Offices: 2371 E. Beverly Dr., Los Angeles 16, Calif.



## TAL Aims for Scheduled Service

Named reports it could buy equipment, begin flights next week both require one week after CAB approval.

Tennessee Air Lines has completed financing arrangements to buy adequate equipment for start of scheduled passenger and cargo services across the Pacific, and from Atlanta to Los Angeles. Based upon the two reports.

"We could start daily service across both coasts in a week, if demand warranted," Tennessee general executive Nicholas declares. "All we need are those CAB machines."

► **\$1.5 Million Profit**—Nelson's disclosure of the financing arrangement follows a report that the parent company made a net gain of more than \$1.5 million during the past fiscal year, despite an operating loss of some \$850,000. Total profits amounted at \$138,000 after taxes were reported for company subsidiaries.

Book value of company stock increased from the equivalent of \$4.95 per share during the year to \$6.75.

The net gain is shown on an auditor's statement for the year ended last May 31. A supplementary report says second revenues and considerations have supported the company's position over this time.

► **Heavy Aides**—Nelson says his company is in healthy condition "growing faster over year" with "a lot of our growing power behind us."

Tennessee subsidiaries had their best year in 1953, he reports. They all made money and now are almost entirely self-sufficient, requiring little subsidies from the parent company.

Nelson notes that the subsidiaries have done a good job in carrying the

parent company through the ups and downs of contract operations. It has been forced to conduct its own private flight for CAB certification.

As a means to an end, the company's diversification has made the operation big enough so that it can develop profitable, a subsidiary in a business that must take time to develop. It has made TAL largely self-sufficient, able to service and maintain its equipment economically.

"If you're not a complete novice, you can't control your costs," Nelson says.

It has allowed Tennessee to hold together its "know-how." The company was big enough, for example, so that when the subsidiary Aircraft Engineering & Maintenance Co.'s business dropped to nothing between the Boeing and Boeing 747s—only half a dozen remaining on its official payroll—TAL was able to absorb some 150 key employees into other parts of the organization.

► **Continuing Effort**—TAL's operating loss, Nelson explains, was to considerable degree the result of the company's continuing effort to get CAB certification and its evidence, to maintain facilities and contracts in the Atlantic and European areas so that the airline will be in a position to operate if and when a franchise is awarded.

Tennessee has kept up its best at Bradley Field, Conn., line stations at Concord, New Bedford, and Swansea, Ireland, and offices in Frankfurt, Geneva and Rome.

► **Money Making**—Biggest money makers



### Chinese Nationalist Tests New Copter

The twin-engine, two-place, differential drive, designed and built by C. I. Chen, a major general in the Chinese Nationalist air force, has started its test program in Taiwan, Formosa. Designated the C-203, it is powered by a 190-hp Lycoming, has a design top speed of 92 mph and

vertical climb of 450 ft/min. Construction is steel tubing, metal riveted. Rotor diameter is 25 ft. and gross weight is 2,090 lb. Maj. Gen. Chen's earlier CJC-4 and CJC-3 copters were combat types built on the Chinese mainland prior to evacuation. It was produced from MIT in 1950.

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# BOWER

ROLLER BEARINGS

among the subordinates were the Tyson versus Baggettman Corp., construction firm that made a profit after costs of more than \$100,000, and Arneson, which is getting under way on a \$2-million contract for maintenance and repair of 7-11 turbines. But in the set field to be awarded is a company other than the manufacturer.

Arneson is working on 10 of the 100 odd turbines to be loaded. When work on them falls under the subordinates will have 150 places on the same case line at a time.

► **Airbit Operations**—Flight work, the point complete to handling includes a three-month contract for 90 roundtrip flights to the Korea airbit, says when TAL had two under the Air National Command's new policy of avoiding contracts in open competition.

Tennessee was a partner in the airbit and has flown some 16.5 million miles to the operation, about 11% of the total for commercial carriers.

The company, it is especially good at its aircraft maintenance, figures for the airbit, according to 11.7 hours daily.

"We're getting satisfaction for beyond our loaded duties," Nelson says, "and with fewer than 100 of maintenance work per day here. We get 30% more satisfaction now than we did in 1960 and with half the number of maintenance. And our planes are so better maintain. We've not before until they practically don't happen."

► **Flight Contractors**—TAL, last month started on a contract with the Inter-governmental Committee for European Migration for transport of 792 migrants from European cities to the New York.



### Checkup

Dr. Nelson A. Coughlin (left), Assistant Secretary for Defense Health and Medical, appears into the cockpit of a Lockheed P-40 all-weather fighter during a recent visit to Wright Air Development Center, Dayton Ohio. The visit to WADC was part of a tour of USAF, Navy and Army centers during which Coughlin gathered first-hand information on military activities.



## recognize what function these products have in common?

**At** You're right if you say vibration control. But there's more to it than just that. Each has answered a special vibration problem encountered in the aviation industry.

- (1) Isolating engines from airframes, MB Engine Mounts limit a 25-year record of outstanding service. Newest all-aluminum development shown weighs 267 lbs. as against 40 lbs. of former type.
- (2) Airborne radar antenna system was enabled to function properly when vibration and shock problem was eliminated by the MB-designed mounting.
- (3) To protect instruments and equipment, this "AS" type isolator was designed with multi-directional vibration absorption.
- (4) Used with "inboard" engines, this special engine mount protects against vibration and shock in shipment.

When you're dealing with vibration, remember to contact MB for the recognition of a vibration specialist.

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HEADQUARTERS FOR PRODUCTS TO ISOLATE VIBRATION

... TO EXCITE ... TO MEASURE ...

## What JACK & HEINTZ is doing about...



J&H now in production on two new 50,000-foot inverters. Models rated at 2500 va and at 1500 va.

Both use improved, longer life regulator—adaptable to similarly rated J&H inverters now in the field.

High-altitude, 250-volt model available soon.

Now in production at Jack & Heintz are two new inverters (motor-generators) approved for 50,000-foot operation. Model F147 delivers 2500 va at 50,000 feet and +20°C ambient temperature. Model F137 is rated at 1500 va under the same conditions. Both models are 115-volt, 400-cycle, single-phase rotary units (3-phase units are now undergoing qualification tests).

Improved electrical insulation, redesigned commutator and brush arrangements, new housing configuration for better air flow, and the new FRB speed and voltage regulator assembly represent the major advances effecting this high-altitude inverter performance.

A smaller but no less important inverter for 50,000-foot operation is slated for early production. Designated as J&H Model F17-1, it is a 250-volt unit actually capable of operating up to 65,000 feet with some derating.

Our engineers will be glad to work with you in developing inverters or other Rotomotive equipment to meet your specialized needs. Write Jack & Heintz, Inc., 17085 Broadway, Cleveland 4, Ohio.

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## HIGH ALTITUDE INVERTERS

J&H 50,000-FT F137 AND F147 INVERTERS NOW IN PRODUCTION



★ NEW HOUSING CONFIGURATION FOR BETTER AIR FLOW

★ REDESIGNED COMMUTATOR AND BRUSH ARRANGEMENTS

★ IMPROVED ELECTRICAL INSULATION



NEW FRB SPEED AND VOLTAGE REGULATOR FOR F137 INVERTER. PROVIDES INSTANTANEOUS OPERATION WITH NO WARM-UP PERIOD. VOLTAGE REGULATION CLOSER THAN PLUS OR MINUS 1% AND FREQUENCY REGULATION CLOSER THAN PLUS OR MINUS 2.5%

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tion between Jan. 1 and Mar. 31.

This contract followed completion of one with the firm during December for flying approximately 5,000 military dependents in 25 days between the New York area and Wiesbaden, England, and Frankfurt, Germany.

JAL also has a contract to serve the east territory of Pacific islands and make weekly flights to island centers in the Marshall and the Marshall, plus emergency flights to several Pacific air bases to assist the fleet of F-4s currently used with Guinean military airplanes.

The airline is flying regular DC-4 routes from Honolulu to Oakland and between Honolulu and Guam. JAL reports it carries 10% of the passenger flying in and out of Honolulu, making about 5% of the trips.

Global Progress-Airtranscar negotiated a new charter service in Afghanistan last December providing weekly flights between Kabul and Cairo, a distance of 2,500 mi. An Jordan, with which the U.S. has a management agreement, is conducting the opera-

tion, using DC-3 biplanes.

JAL is providing pilots and dispatchers for Japan Air Lines, scheduled to begin Tokyo-San Francisco direct this month, as well as mechanics for the Japanese Aircraft Maintenance Co. which will handle JAL maintenance in Japan.

Under a technical training program, the airline is providing flight instructors to train Japanese pilots and expects to have all JAL pilots on domestic routes by June 1. The company also expects to complete a maintenance training program for Japanese mechanics by July.

JAL has a small interest in Japan, but does not expect to exercise its option for purchase of more stock, which capitalization is increased in the next future.

A flight operations based at Pago Pago, N.D., is engaged in crop dusting in that area and is in its third year of a contract with the State Department for forest control in 10 countries in the Middle East. The contract calls for spraying of selected areas along with



### Closeups of New Agricultural Plane

Interesting details of new Coastal Leisure Air Tractor agricultural plane, are revealed in close-up photos of detail which illustrate the light test program (Aviation Week Jan. 18, p. 7). Top picture shows how bridge runs together behind pilot with low fuselage extending to tail. The low tail is used to permit easy clearing of structure after use of corrosive lime chemicals.

Note large and plain air wingtips. Close-up view of Air Tractor shows instruments mounted externally in pilot position of upper wings in pilot can view them and at same time work the ground and obstructions while flying low. Powered by a 450-hp P/Wa, Waco Jr., the plane can stay a hold as much as 2-300 ft. Coastal Leisure Corp. is located in Yakima, Wash.



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Fafnir Self-Aligning, Tapered Roller Type Ball Bearing... a variation of the AFB 301 87-8 Series

Two recent additions to the Fafnir Line of Aircraft Bearings feature design simplifications for improved control systems on high speed aircraft. The DSKP Series offers not only the greatest capacity for its weight and size, but also the simplest, free-proof construction. The KIP-B Series is a means not only of cutting down on space and weight, but of greatly simplifying bearing installation with a resultant saving in cost and time.

These far-reaching advantages are typical of the results gained by Fafnir's continuous research, experimentation and collaboration with aircraft design engineers. They reflect a determination to stay "on the ball", to keep in step with aircraft progress. That explains why Fafnir continues to get and to welcome " tomorrow's jobs " to do today... and why Fafnir is the largest supplier of bearings to the industry. The Fafnir Bearing Company, New Britain, Conn.

Every new achievement serves as a "take-off" for still greater Fafnir advance.

1022 Aircraft Type K, KC, 12 Bearings

300-41 Aircraft (Roller), Guide Ball and Thrust Ball Bearings

1197 NAB Aircraft Pulley Bearing Series

7104-20 Aircraft Ball Ball Bearings, Double Series

1040 Fly Ball in Aircraft Bearings

## FAFNIR

### AIRCRAFT BEARINGS

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## Australians Revamp F-86 to Take Avons

• Commonwealth version of sabre has 60% new fuselage to take bigger engine, heavier guns.

(McGraw-Hill World News)

Melbourne—Australia's version of the F-86 Sabre, built by Commonwealth Aircraft Corp. Pty. Ltd., appears very little different from the F-86 produced in the U.S. by North American Aviation, Inc.

But substitution of the higher-thrust Rolls-Royce Avon for the General Electric J47 used in the U.S. jet, and the replacement of the 30-cal. machine guns by cannon of heavier caliber, have required so many internal changes that only about 40% of the original fuselage structure has been retained.

• **Avionics Modifications**—In the larger Avon engine economy some 25% more air flows through the compressor, it was necessary to increase the size of the turbine duct compressor. This appeared to present serious difficulties at first, but a simple solution was achieved. The duct fuselage is split horizontally and a wedge of structure is inserted in the split, thus dropping the lower line of the fuselage some 3½ in. at the front.

In order to achieve as much of the original structure as possible in this change, extensive joints are let into the sides of most of the fuselage frames in the region of the rear-compressor. New fuselage was necessary only in the rear section dictated by the change in the guns. The split in the duct is covered by a wedge-shaped strip of skin and the gap in the outer surface is sealed by cementing to the skin panels.

This comparatively simple modification leaves undisturbed the complex cockpit arrangements and the nose wheel linkage in the lower half of the fuselage, thus saving hundreds of hours of engineering and testing time.

• **Engine Moved Aft**—The Avon engine has much the same dimensions as the J47, but the mounting points are quite different and the weight much reduced. Consequently, it had to be positioned much further aft in the fuselage in order to preserve the original center of gravity position.

In order to move the Avon engine completely supported within the forward portion of the fuselage, it was necessary to move the fuselage back



AUSTRALIAN SABRE has deeper forward fuselage, more powerful guns than . . .



U. S. SABRE, which is powered by GE J47. Avon has 60% new fuselage.

joint rearwards to the new location of the engine mounting structure. Thus the rear portion of the fuselage is shortened by some 28 in. and the forward fuselage lengthened by a corresponding amount in order to preserve the original length of fuselage.

• **Cooling and Venting**—The Avon engine brought many problems of cooling and venting, as well as the more physical problems of access and maintenance. Thus, from the rear view aft to the fuselage break joint, an entirely new structure (within the original lines) was required. Moreover, a gearbox assembly from the engine was required, as provisions had to be made for either electric or liquid combustion starting. This took all the space within the engine nose fairing which is occupied, in the case of the J47, by the hydraulic pumps and generator.

In the area of this change followed changes in the shape of the fuselage fuel tanks (and consequently in the fuel piping system) and the repositioning of

accessory services. Cooling and venting of the Avon engine for all flight and ground conditions was a major problem, as it was desired, in the interests of reducing maintenance time in the field, to have all structural temperatures to a minimum of no more than 200°F.

• **Forward of Fuselage**—In the nose forward of the forward fuselage there is no great source of heat as this portion of the engine is comparatively cool. However, it is necessary to vent the same to remove all fuel and oil fumes that might accumulate to form an explosive or combustible mixture. Thus all drain lines from fuel gauges and filters have been led overboard and the same is vented in flight by small NACA-type drain orifices in the outer skin, exhausting through an opening on the top center line.

To cover the case of ground static conditions when no exhaust is available through the side orifices, a cooling flow is induced by means of ejector



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along through the exit opening on the top center lead

Alt of Firewall—Alt of the firewall, there are great sources of heat in the combustion chamber, turbine shroud, exhaust case and turbine. Hence, all in contact structural members such as legs and main frames have been fabricated of corrosion-resistant steel 316L and main frames are fabricated of 75S aluminum alloy. All control cables and hydraulic services have been isolated in stainless steel tunnels carefully insulated with end air.

The area is cooled by a flow of air between the engine-turbine combustion and the landing structure, the air flow entering through these two apertures in the outer skin and exhausting through an annulus around the jet pipe nozzle.

In flight, the main pressure receiver, all the valves provides a sufficient cooling flow, but a light air pump has been designed to provide sufficient cooling airflow in the case of engine running at full thrust on the ground and during takeoff.

The air pump is simple in principle, consisting of a line bleeding air from a high pressure stage of the acid-flow compressor and delivering this air to a tube lead into a cavity and perforated in the cooling air exhaust manifold, or lead with the jet pipe. A series of five die holes in the tube project streams of high pressure air outward, thus air passing suffered in from the annulus to produce the necessary cooling air flow within the landing. This purging action is necessary whenever the air duct is stationary with engine running at a very low speed. Then it has been arranged that the bleed line is open only when the engine is started and continuously an valuable compressor air is wasted when maximum thrust is needed in flight.

Printed in England—At these times is always unknown in the design of the cooling system, a dummy landing in incorporating all cooling passages was constructed and shipped to England and, with the cooperation of Bath Royal, was tested in a static rig with an Avon engine under all conditions of engine thrust.

Structural temperatures were measured and adjustments were made until completely satisfactory cooling arrangements were achieved.

No Coolflow—The Avon engine delivers from the H7 is not being able to support the turbine in sufficient fuel flow. When the desired rate of landing had to be redesigned to support the jet pipe in such a fashion that neither turbine would have any exposure. High loads are transferred to the engine. Additionally, the jet-pipe supports had to provide for any removal of the rear landing for inspection and adjust-



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most of the engine and tailpipe.

For security reasons, little was to be said about the aircraft changes, but great attention has been paid to solving problems and an exceedingly low turn-around time, covering light servicing and rearming, has been aimed at.

• **Mockups Helped—**Throughout the project the fullest possible use has been made of mockups and full-scale cast patterns for testing and space inventing purposes.

Initially, mockups of both engine and armament installations in wood were made to fix the disposition of and access to the many units involved. This was followed by a metal structure, representing the skeleton of the fuselage.

All structural members, except the skin, were accurately represented and actual components were mounted in their correct positions.

This served two purposes: • It confirmed the clearance between equipment, engine, lines, etc., and the structure and access to these units. • It served as an assembly jig for the first set of hydraulic, fuel and air lines, and electrical cables. Each line was belayed to fit and placed in its correct position, and as the rig was spun, having no skin, many men were able to work satisfactorily.

In this way, all pipes and cables for the prototype were assembled long before the fuselage structure was ready to receive them, and the usual difficulties and delays of prototype equipment installation were overcome while the structure was still being fabricated.

This rig has also acted as a training ground for the key assembly men who now turn the backbone of the production final assembly line, and their knowledge and experience was gained with no interference with the structural assembly. A complete fuselage was also fabricated and riveted in a specially designed and erected loading machine. Loads corresponding to the weight that will be met in the air were applied to the structure by means of hydraulic rams, and stress and deflection measured by means of strain and dial gages. Thus, before the prototype aircraft flew, a comprehensive knowledge of the actual strength of the aircraft had been obtained and it had been demonstrated that the strength was more than first required.

## Hughes Sets Aircraft Plant Safety Record

The national safety record recently established at Hughes Aircraft Co.'s Culver City, Calif., plant lay on both-time accidents in industries connected with aircraft manufacturing, is attributed to a constant educational program and the work of 10 safety committees

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The Hughes record—close to 5½ million suitcases since constructed—surpassed the previous record of about 5.1 million suitcases, established about 11 years ago by Fisher Body Co.'s Detroit Aircraft Division of General Motors.

Extensive value theory is being used by the National Bureau of Standards to aid in the solution of such problems as the effect of transonic gust velocities on aircraft structures.

It works something like this: You design an engine structure for a given gas load, and you know that the structure will take that kind of a load in flight. What you would really like to know is how often that gas loading is likely to be exceeded. Extreme-value theory will give you the odds.

Or take the case of the tensile strength of a uniform bar of material. You would like to be able to predict its ultimate strength, but you can't by usual means. So you consider the bar to be made up of a huge number of very tiny pieces and by means of the extreme-value theory, predict the strength of the weakest piece. That's the strength of the bar.

► **Outlier**—Extreme value theory is one of the statistical tools. It refers to an unconventional distribution of some phenomena.

Normally, distribution of scores on constant—such as student grades in a test, to use a common example—is symmetrical about an average. The symmetry precludes the use of extreme-value theory.

But if the distribution curve is not bell-shaped, but distorted, and rises to a maximum on one side of the average, then the chances are greater that the larger values of the phenomenon will occur.

• **Flood Control**—This theory was first applied to the problem of flood control. Currently it is being used to study pest effects.

Instead of measuring all the gusts which occur in a given test flight, a modified instrument records only the maximum value. Thus a single test flight gives only a single test point.

Data from a number of flights are collected and plotted and the graph shows the probability of exceeding the most violent gust in any other flight. In one example, the chances of an exceeding non-overseer gust was one which were measured during the flight test program was about 1/1000.

The Bantua's program was originally sponsored by NACA.

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**Baltimore**—A visit to the new multi-million dollar plant which Westinghouse Electric Corp. has built near Friendship Airport to house its Air Air Devices, and conversations with officials who run the operation, indicate that Westinghouse intends to maintain and hopes to expand, its recently won role as one of the nation's major producers of isolators for control systems.

Under the control systems, developed and produced here, will equip the Navy's second jet interceptors in two days' notice, boom here, do, or right, as are slated for use in new British interceptors. Air Arm officials also hope to crack the Air Force jet control market currently dominated by Hughes Aircraft Co.

The Air Arm Division has also developed, and is producing, bomber-to-bomber armament in the form of a radio-controlled gun turret for a new Navy attack bomber. Westinghouse anticipates another Air Arm product, in use on USAF's Lockheed F-94C and slated for later models of the Republic F-84D.

• **Raccoon Entrance**—Compared with companies like Sperrin and Bowler, West engineers as a recent entrant to the highway field. Despite this, Western lures bids there to several separate firms, including:

\* First value constant 100. Nany (Down)

in F-10, equipped with Westinghouse fire control and flown by Marine Corps crew in Korea, is credited with first in-troopster radar kill in combat (JAAAF-1000 Wings Feb. 9, 1955, p. 18).

\* First production free control intercepter TF-54 intercepter, based on the F-54C, is called first production-type equipment designed to maneuver interceptors into firing position in accordance with target data. (Hawthorn Industries)

- **Magnifier pliers.** Westinghouse says it has patented in this country the widespread use of rugged magnetic amplifiers to replace vacuum tubes in various equipment.

• **Change in Policy:** The Air Annals, founded about two years ago, represents an integration of many (but not all) of Westinghouse's aviation activities under one roof, and an expansion of these activities. As such, it is a sharp departure from the company's pre-World War II policy.

Fans to the site, Worthington's sales to the military consisted largely of modified versions of its standard industrial products, such as turbines, motors, synchros, and controls. When war came, the company's consumer goods and other non-military facilities were converted to producing combat-type military items. The company hired its self-manufacturing a strange assortment of them, some bought to its standard line, some designed by other com-

persons which had been engaged in purely military work prior to the war.

Like every other, Westinghouse had its problems in adopting the drawings, designs and production techniques of other companies to a manufacturing organization accustomed to its own long-established procedures and techniques, according to Frank W. Gachis, Jr., manager of Westinghouse's several Bellmoun divisions (which include Air Arms, Electronics, and X-Ray, the latter two located separately in Bellmoun, Ariz.).

■ **Lessons Learned:** This wartime experience was one factor behind the company's pushback move to set up personal engineering and manufacturing facilities devoted to military weapons work during peacetime. "In the event of war, Air Arm can find designs, know how and work to our civilian product plants, and we are set up to do it quickly," Godsey says. But there were other factors behind the formation of the Air Arm division.

"The most complex weapons systems require cooperation with considerable breadth, including finance, facilities and know-how," Cady points out. "Westinghouse has such breadth and feels a corporate responsibility to take on such difficult defense assignments, he insists out."

• **Military Business Attractive**—Westinghouse management also considers military business attractive, despite its inherently low profit return on sales. Codacy says. However, it is that the company puts more emphasis on percentage return on assets than return on sales, he says. "With reasonable growth rates," Codacy expects Air Arm to prove a financially attractive partner to the company's normal industrial and commercial activities.

In 1994, the Air Force expects to ship 570 5100-gallon worth of ordnance.

**WESTINGHOUSE'S NEW AIR ARM PLANT** is located adjacent to Baltimore's Friendship Airport, including flight testing. Hangar connects with ramp at by bus stop.

**ENVIRONMENTAL TEST CHAMBERS** used by Worthington to subject equipment to full weather tests. Plant also has a fence stand, complete with wind chamber.

**BATTERY OF ANALOG COMPUTERS** is used in work on autopilots and to control engines. Computers are connected to aircraft control systems in shipping, too.

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equipment, Goshes says, and by adding in "the below estimate required." Total plant employment, now at 2,700, is expected to rise to 4,000 by year end.

► **Air Awa Nucleus**—When Air Awa was formed, the nucleus of the new division came from Westinghouse's Special Products Division. This was a "catch-all" for company activities which did not fit logically into regular industrial or commercial lines. This division first got into military avionics work, early in World War II when it was asked by the USAF to develop a computer for the B-29 fire control system, as a backup to the General Electric program.

The division also did gyro stabilizers for work for application to Army tanks and to the Douglas B-24 personnel gas night. This in turn led to the development, after the war, of the company's autopilot, the first of its kind in this country to use rate gyro as feedback.

As the state of the art in computer fire control advanced to the point where engineers were considering tying the solid computer into the autopilot, it became apparent that a new type of autopilot was needed. When Lockheed decided to try such a "closed loop" system on its F-94C, Westinghouse had the pump on competition and landed the autopilot contract.

► **Air Awa's Role**—Air Awa was its

successor role in this development. It says, and the company, as an airborne avionics, such as aircraft fire control and stabilization, missile guidance and stabilization, according to E. M. Brown, research department division manager. The company's work is not restricted to "big and piece" type of business, says it (cannot hope to compete with the "left type operator" on products with a low engineering cost).

Not all of Westinghouse's activities were assigned to Air Awa. Aircraft electrical guidance and distribution system equipment is handled by the Avionics Department of the company's Scott Motor Division at Lima, Ohio. Large load and discharge rates is the responsibility of the Electronics Division, Baltimore. If this order is desired for use in avionics, Air Awa and Electronics Division may work jointly, as the project.

Adaptation of Air Awa's interest in commercial aviation, Dr. S. W. Taylor, manager of engineering, replied: "It has never been as large as the military, but it is interested." (Air Awa has designed an instrument approach and flight director which American Airlines is currently testing on a Cessna.)

#### Plant Facilities

The new 152,000-sq. ft. plant adjacent to Friendship Airport is a shock absorber for Air Awa's mission. For its share, the type of avionics equipment which Air Awa designs requires lots of experimental flight testing, usually in various frequent modifications and modifications. This makes it desirable to keep flight test activities close to the engineering department.

► **Equipment Is Ready**—Air Awa's 25,000-sq. ft. flight test range is located only 120 yards from the main plant, and is connected by a short bus strip to the main airport runway. It includes two 9,500-ft. runways (with room for two more parallel runways), making it suitable for Air Awa's pit operations. It is currently being a Navy F3D and a USAF F-94C. The airport is equipped with both ILS and surveillance radar.

Baltimore itself is the site of the USAF's Air Research & Development Command, and is truly built as home away from the Navy's BuAer and the Pentagon in Washington. The Navy's aviation center at Patuxent River, Md., and the Wright Air Development Center at Dayton are also based.

► **New Flying Range**—Adding the first step, a flight range is being constructed which will enable Air Awa engineers to check gun target performance, observation patterns, ammunition feed rate) with the equipment installed in the airplane. To check target performance:

under extremely cold conditions, a chamber is being installed on the flight range which will permit targets (mounted) to be fired at temperatures in low as -75°C.

Environmental test facilities within the plant itself include altitude, temperature, humidity, salt spray, fog, wind, mist, impact, and a carrier acid chamber. One last chamber, large enough for personnel to enter, can simulate altitudes up to 30,000 ft., at temperatures of -55 to 100°F.

In going to such extensive test equipment, test facilities, Westinghouse expects to prove out practically all aspects of equipment design itself and

not need field military evaluation with its own ground equipment electronic equipment.

► **The Factory**—The Air Awa plant, like most new ones, consists of a single-story factory area, with office area and engineering labs in a two-story structure adjoining two sides of the factory. The plant is well lighted, 10 ft. ceilings, per sq. ft., and occupies an area of about 11 acres on the 75-acre plant which Westinghouse owns.

At the moment, the factory area worked double shifts, a night and evening shift in evidence. There's a signal explanation for this condition.

Prior to building the new Air Awa

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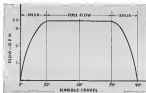
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the *equipment* of *control equipment*  
application of *highly* and *new* *equipment*.

plant, Westinghouse formed out production of the W-33 autopilot for the F-94C and early models of its Navo for control systems to other divisions of the company. Rather than transfer these patents exclusively, the company decided to limit out production of these older designs as their original to others. Only new designs, now going into production for the first time, are being manufactured at the new Air Arm plant.

Competition With Hughes—Inasmuch as Westinghouse and Hughes Aircraft both produce fire control equipment, it is natural to compare their factories. An observer quickly notes two marked differences. The Air Arm plant has comparatively few precision machine tools and has practically none of the automatic production lines found at Hughes.

Whereas Hughes has a large number of repeated precision machine tools, the Westinghouse plant uses U. S. built machine tools, except for Swiss Mader lathes and vises, according to R. K. McDevitt, manager of machine tooling. Major reason for this, is the different design approaches which Westinghouse and Hughes have used in their fire control computers.

Although both companies are analog type, Westinghouse performs its computations electronically, using non-linear

potentiometers. Hughes, uses essentially a mechanical-type calculator (no current systems), which can do precision computations and integrations.

Difficult Philosophies—The absence of automatic type production lines at the Air Arm plant is due to different operating philosophies. Westinghouse does not think it is justified in paying the added expense for a relatively low production equipment.

One spokesman expressed overall Air Arm philosophy this way: "We think the Air Arm manufacturing plant should be geared to small quantity production runs expected from government orders, needs and for plant production runs of new equipment needed in time of war. Better production runs should be based out to other (Westinghouse) plants set up to handle manufacturing on that scale."

Westinghouse is proud of its modern plating room, which can turn out 67 different types of plating. Familiar overhead exhaust hoods for fumes have been replaced by a side and overhead ducting system. A quality-control lab is one corner of the plating room is used to check samples of the plating solution at regular intervals.

Air Arm has helped develop a new technique for breaking color non-specular. The breaking technique involves the use of clean inside the window.

## Design Philosophy

The basic engineering philosophy at Air Arm, as expressed by Dr. Howard, is to achieve the state of fire control not be considered seriously, unless, rather than to risk a bold venture which carries much greater risk of failure. This doesn't mean that Westinghouse is reluctant to explore modern, new approaches. Howard would like them should be investigated independently and that the return a defense should not be committed to an expense in theoretical problems.

If the Westinghouse approach is more conservative than that of Hughes Aircraft, it reflects the fact that the Navo, its principal fire control customer, has a more conservative air defense program than USAF. It may also reflect the fact that Westinghouse is an old line company. Hughes is brand new.

Plant Man Says—Howard feels that industry should "plant lots of development 'buds,' recognizing that many won't mature or grow at all. Instead, with strength, Westinghouse thinks that the service companies should do more development with their own funds. Air Arm policy is to chart a logical course of future development, use whatever funds whenever possible. Fill the gaps with its own money.

For example, Westinghouse con-



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cluded that there was a need for a new type of equipment for high-speed dry lightning. With its own funds, Air Arm developed such a unit and is now atempting to interest the military services.

Getting More Out—Hersold thinks that present radar for control at sea is fast approaching the point of diminishing returns. He believes that more efforts should be devoted to enabling the military units to get more of the potentially available performance out of their equipment.

For example, Hersold believes that fire control equipment must be made easier for the operator to use, more fool-proof. In designing his recent version, Air Arm relied on psychologists, consulted with Baker and Naval Research Lab engineers. The result, Hersold says, is a big improvement over the predecessor equipment, but there's still room for improvement, he adds.

Hersold can see advantages for the military in all the control equipment manufacturers (both Navy and USAF) could standardize the operational aspects of fire equipment, such as into manufacturers' more roomy arrangements on gunship positions.

Greater Reliability—Greater equipment reliability is another way of getting more out of the existing state of the art. One Washingtonian approach to this objective is the wide use of ring-type amplifiers in its autopilot, com-



### Ground-Air Pack-Set

Target spotter for USAF's ground support aircraft, equipped with four channel 26-Mc. UHF communication packet, can operate from baseline cargo plane which can accommodate to radio-equipped ships previously used. New AN-FRC-14, designed under Joint Air Development Center sponsorship and manufactured by Air Associates, Inc., weighs half as much as its predecessor. Air Associates is currently designing an even smaller, lighter weight set.

puter, and radio voice system. Magnetic modulators for radar are also under development to replace hydrogen deviation tubes.

Hersold points out that the only basic limitation to the wider use of ring-type amplifiers is their comparatively low frequency response. This can be improved by the development of better magnetic core materials and/or the use of a higher a.c. supply frequency. Westinghouse is exploring both avenues.

As a comparison, Westinghouse is heavily committed to magnetic amplifiers, and is doing much more research on core materials. Company has spent a million dollars on ring-type manufacturing facilities, much of it at Air Arm.

The other approach under study at Air Arm is the use of magnetic frequency converters to raise the basic supply frequency (400 cps) to a factor of three or more. When ring amplifiers are operated at 1,200 to 2,000 cps, extremely high performance noise filters are possible.

Mag. Amp-Exhibitor Combination—The attractive features of transistor and mag amplifiers have, led Westinghouse, like others, to use both in combination, for experimental servo amplifiers.

At Air Arm, however, a series of ring transformers in production equipment will cover reliable units are available. Meanwhile, the division is experimenting with transistor in a variety of radar and servo circuits.

Another Approach—For these circuits where tubes are required, Air Arm uses small plug-in units, consisting of one, two or three sub-unit tubes, assembled wiring and components, all rigidly encapsulated in plastic for ruggedness.

Air Arm produces three or 40 different printed circuits, in as different use units, for use in its radar, computer, and autopilot approach computer.

While one of these plug-in units can accept chassis layout and circuit wiring, the familiar "cut-and-paste" of no-potential chassis wiring and components. These more important, it simplifies trouble-shooting and repair. The task and only be traced down to the defective plug-in, which can quickly be replaced.

Defective units are discarded since re-encapsulation prevents internal repair.

More Contribution—Westinghouse has made a significant contribution both to repair maintenance and to improved reliability with a new approach to magnetic control systems. All of the many components, except for the coil-inductor and amplifier, are fitted in a frame so they conform to the members of an interconnector's next section. The complete system package can be quickly installed or replaced in a unit, individual components in the package are in no way replaced.

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single package construction, one can look at the P-34C's fire control system, with some 35 "black boxes" scattered around the nose section. However, the Hughes system is of an earlier vintage than the new Westinghouse package. It is possible that some Hughes systems now under design will come in single package-type construction.

Other Advantages—The single package construction permits Westinghouse to fabricate and furnish practically all of the interconnecting wiring between system components, simplifying the initial maintenance by the aircraft carrier.

Another advantage of the packaged construction is that a single deflected cooling system can serve all of the black boxes in the package, with the amount of cooling air for each set according to its internal heat dissipation. This is a more efficient arrangement than the more common practice of putting individual cooling fans in each box.

From a logistic standpoint, the new Westinghouse packaged system is particularly attractive to the Navy. Except for cockpit accessories, the same fire control package can be used on all of the Navy's new crop of interceptors.

Finally, the Test-Wing exchange has made it easy for a pilot, radar operator, or

maintenance crew to get check-out on the fire control system. Equipment can be checked by setting up a test problem (using special boiler assembly), pushing a button, and then watching the radar scope. Air flow balloons through a built-in test position, where it levels.

External test equipment for field use is also required and Air Arm has set up a separate group whose prime function is to get such equipment designed and not so busy. This group handles test equipment design for all Air Arm projects.

Westinghouse says it has been delivering equipment instructions books in advance of the equipment itself. It is very desirable, but not too frequent practice in the industry.

Another maintenance aid is an elapsed-time meter which keeps a running tabulation of the number of hours the fire control is operated. This permits establishing maintenance and overhaul periods based on equipment use, instead of on the less significant air plane hours.

Engineering Staff—Air Arm engineers and department members amount 1,300, of whom approximately 500 are synthetic engineers or scientists, 150 are draftsmen. The balance are in supporting functions, including model shop and flight engineering. Many of the Air Arm test pilots are also engineers, an important requirement when testing complex equipment in a single place aircraft.

The Air Arm engineering staff is definitely larger than its members would indicate. How could it be otherwise? Reason is that the division draws on engineering talents in other company divisions.



### Small Actuator

Lightweight actuator, weighing under 2 lb., developed by Minneapolis-Honeywell's Aeronautical Division for in-cabin use, consists of two-phase 400cps induction motor, velocity signal generator, and 50:1 gear train. Output torque of new model MGT-1A is rated at 1 in. lb. for continuous duty, 1 1/2 in. lb. under stalled conditions. It measures 2 1/2 in. dia. and 5 in. long. MHH says actuator meets all appropriate MIL and AN specs.

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patrons were sending representatives. Sanders says it is offering the owners as a service to industry. Experiments will be completed early next Feb. 79.

► **World's Tiniest Relay**—Wards for G. M. Gurnea & Co. to announce a pie-sized relay, possibly the world's smallest—at least this size of the Iowa Gurnea. New relay will be accurately sealed in glass, will be available in either single pole normally open or normally closed models. Device will be made in East Orange, N. J.

► **MHI Tests Fuel Control Complex**—Messerschmitt-Hesseler says it has developed and successfully tested an electronic fuel control system complex for its autopilot which enables an aircraft's fuel controller to measure the plane automatically into flying position. The test plane is believed to have been a Northrop F-5D, which uses the MHI E-11 autopilot. For its complex design studies, MHI purchased additional batteries of wiring computers to enable it to conduct simulations three times simultaneously.

► **New Miconing**—Harris—Two microwave component manufacturers have signed license agreements with International Telephone & Telegraph Co. to manufacture its newly developed Miconing (microwave control) microwave components and planning, following ITT's licensing offer to the industry (Aviation Week Nov. 30, p. 56). A company spokesman reports a third firm is ready to sign. The two licensees are: Carl W. Scheraga Miconic Co., Lombard, Ill.; N. Y. and Diomed Miconic Corp., Wakefield, Mass.

► **ANDB Reports Elko Radar**—Evaluation of the British E. K. Cole "space man's OCA" (Aviation Week Dec. 8 1972, p. 59) by the Manassas Corps under Air Navigation Development Board sponsorship, showed it to be inadequate for leading critical data using aircraft or helicopters, as ANDB spokesman says. Tests showed that it was too difficult for operators to keep too wide windows displayed on the eyepiece aircraft and that the use of calculating lights and an A scope (instead of a PPI) did not provide the operator with sufficient information on the aircraft's position. These possible shortcomings were noted in the Avionics Week article.

► **No Go on Mag Amplifier**—Collins Radio has abandoned its attempt to come up with an autopilot which uses magnetic amplifiers throughout and will use a few vacuum tubes in the radio-remote version. Company is currently demonstrating autopilot, installed in a Twin Beech, to airlines to get their comments. —PK

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## AA Reports on DC-7 'Teething' Troubles

Problems uncovered in first two months of operation have been minor, carrier says; pilots like the plane.

By George L. Christian

American Airlines is well pleased with its new, speedy Douglas DC-7s after the first two months of scheduled operation. "Teething" problems have been relatively minor.

American reports its pilots in saying that the plane "has beautiful control characteristics," and maintenance personnel comment that the ship is lively trouble-free, considering the numerous changes and modifications the transport encompasses.

The carrier has purchased 25 DC-7s, 12 low-range and 13 medium-range versions of the plane. Commercial service was inaugurated on Nov. 29, 1955. The airline casually has taken delivery of one DC-7s, expects to have its whole fleet by April of this year. Late last month, American announced its New York-Los Angeles schedule to two roundtrips daily in each direction.

American West went to AA aircraft to find out how the aircraft was behaving during its initial phases of commercial operation.

**Frank Tule-In** a task discussion of pros and cons of the first two months of DC-7 operation, American officials conceded that the airline was having trouble keeping its 7,753-hr. scheduled schedule.

In an equally outpouring estimate, AA engineers pointed out the strong and weak points of the aircraft equipped and components. Particular emphasis

was placed on three features new to the DC-7, which did not exist on any of the preceding "DC" family.

► **Spandair Sesto-Aerocraft** is adopting a five-pronged program to solve the last eight out of its 7s, to meet its line-throughline scheduled, non-stop transcontinental schedule. To date, a good percentage of the westbound flights have exceeded eight hours, due to the heavy headwinds encountered during winter storms, coupled with the fact that the 7s have to fly some 2,000 ft. under the 25,000-ft. cruising altitude originally planned, because of power drop when the plane's Turbo Compound engines are turned out to cruise fuel consumption (Aviation Week Dec. 28, 1955, p. 11) American's program.

► **Better ground operating procedures.** American is working out ways of cutting in its schedule sometime the time from blocks to blocks.

► **Better altitude operating procedures.** The carrier is experimenting on precise navigation, coupled with the best possible weather forecasts, to allow pilots to fly optimum flight paths—the route of the shortest time regardless of distance. Aeroplots will help too.

► **Technologically closer schedule.** AA is looking over its 7s with an eye to cleaning up every possible part of the plane to reduce drag as much as possible. Examples are better sealing of gaps between trailing edge of the wing and aileron and flaps, possible use of

spinners on the propeller hubs, and generally better lining around the trailing wing area.

► **Better engine performance at altitude.** The airline's powerplant engineers are consulting with Wright to see if it is feasible to improve the Turbo Compound's altitude performance, possibly through modifications to the engine's supercharging system.

► **Performance Summary.**—Among the advantages of the DC-7, never before offered on Douglas' DC-series aircraft, are the Turbo Compound engines, all-electric instruments, and Proton air conditioning system.

► **Turbo Compound engines.** These new-type powerplants, embodying a completely different method of power recovery through three exhaust-driven turbines whose energy is returned to the engine's crankshaft through a fluid-drive-type coupling, have operated quite well, says AA. To date, the airline has experienced two turbine failures, one with a small fix, one without. And three temperature sensors have failed. Wright Aircraft is already engaged in remedying both types of malfunctions.

► **All-electric instruments.** The DC-7 is the first commercial Douglas plane (and probably the only modern commercial air transport except for the Boeing Stratojet) which does away entirely with the vacuum system. All gage instruments are electrically driven. (And since the firing cylinders are thermally deiced, there is no need for a vacuum pump.) The alternating current system itself is working very well, according to AA electrical engineers, although some

## How big areas of curved Multiplate are used in the windshields of the Douglas AD-5



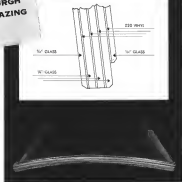
### A report from THE PITTSBURGH AIRCRAFT GLAZING FILE

DESIGN of the Douglas AD-5 "Skyraider," called for a divided windshield of curved bullet-resistant glass more than one inch thick. The accompanying diagram and photograph show how Pittsburgh Plate Glass was engineered to this job.

The Multiplate used in this windshield consists of five plates of glass with vinyl fillers between. In the cross section above, the inside and outside plates are 3/4" and the three interior plates of glass are 1/2". Vinyl fillers are .020", giving an overall thickness at this point of 1 1/2" + 1/8" - 0".

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**Electro-Mechanical Actuators**

ing engine and guard at that point.

► **Turbine Failure—American** has experienced two turbine failures. The first occurred during takeoff from New York International Airport, when the plane was still on the ground. A small, localized oil fire ignited which was quickly extinguished. There was no sign of any consequence. It is few passengers sustained minor burns as a result of using the emergency evacuation slides. Apart from the engine, the plane was undamaged.

► **Overheat—First Turbo** Compaq turbine failure occurred on No. 2 turbine on No. 2 engine, Dec. 21, 1973. First indication of trouble was from the fire warning system. Since plane had not quite reached V<sub>1</sub>, agent, pilot alerted on the radio, around 11 feet per second, shut down No. 1 engine, and brought the plane to a stop, it stalled, but.

Because of the fire warning, pilot elected to evacuate his passengers via the two emergency escape slides. This resulted in a couple of burned shoes and a rope burn of two walking near service. The main oil fire, set by exhaust heat, was put out with a dose of CO<sub>2</sub>. (Note that the Port of New York Authority's fire engines, which were quick to appear on the scene, put out the fire—A note to be a lesson in what not to do.)

Careful analysis of the incident revealed that the failure, which resulted in the turbine shedding its blades, was due to the turbine becoming decoupled from the engine, American engineers say.

When it happened, the turbine is suddenly went into an over-speed condition, once coupled, pressure on the turbine still existed, but there was no restraining force to keep the inert turbine spinning again.

It is interesting to note that Wright built a controlled over-speed condition into its Turbo Compaq turbines. To insure an over-speed condition of not more than 25%, the manufacturers drilled small holes in the flange of four blades per turbine, spaced at 90 deg. to each other. This weakens the flange sufficiently to guarantee breakage at not over 25% over-speed. When the control blades rip off, this triggers the rest of the blades and the turbine is decoupled. Object is to insure complete separation of the blades by the flight load without having to endure that member to an unreasonable degree of weight.

Decoupling of the No. 2 turbine (which is at the 7 o'clock position) was traced to the failure of a turbine drive gear adjacent to the turbine's fuel coupling. The gear failed, had its wear in a bad mark on the gear.

Wright immediately changed its surface finish and broke the edge

of the gear to give it greater radius.

► **Magnet Assembly—The** cracked flight load retained most of the shaft, drag blades, but retention qualities were marginal. Some pieces actually penetrated the hood. When they got through their had been closed to the engine. But the one piece was still working fast enough to pierce the engine's diaphragm between No. 1 and 2 zones.

A redesigned, standard hood is now being installed on a test engine.

► **Hood Problem—The** problem facing the engineers was not only one of designing a hood which would retain the blades satisfactorily in case of turbine failure, but also of producing a unit rugged enough to keep it from parting from the inside due to the excessive energy created when the blades let go. In this particular case, the flight load did come off and dropped into the bottom of the engine cowling.

In connection with this incident, American engineers spoke highly of the Kalle combustion-timing type fire detector which is a new installation on A-10's. In this incident, it gave adequate warning. And, they added, the system is sensitive and gives good all around protection.

► **No Oil—The** second turbine failure occurred Jan. 7, on an outboard flight was coming over Bryce Canyon, Utah. Failure was on No. 3 turbine (on 5 o'clock) on No. 4 engine. Propeller was feathered and flight returned to Los Angeles on three engines without further incident. Return flight took 2-32 hr.

This failure was detected by the flight engineer and co-pilot, who were taking readings on engine exhaust temperature. They noticed that the exhaust flame from the No. 3 turbine of No. 4 engine was excessively orange and spoke was firing, below the cowling. The prop was feathered immediately. There was no fire.

Immediately after the incident, no failure of the turbine shaft between the cooling apertures and the turbine wheel at the shaft system. Contents of the train box was probably "O" ring failure at the bottom of the assembly, American says. This prevented lubricating oil from being forced to the shaft's bearings.

American engineers conjecture that it is reasonable to think the shaft's upper bearing failed because lack of lubrication caused overheating. This in turn could lead to excessive wobble of the shaft creating an interference between the cooling cap and wheel, leading to failure of the shaft train.

In this case, there was one fracture of the flight hood (the hood was the old type, not having yet been tested in a wind tunnel with the latest engine installation). The fracture occurred in an unheated part of the unit. A

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peer of the turbine put at least one crack in a civil lip. Force of the turbine blades split the world in the air's talpae.

AA engineers said that the failure probably would not have occurred had the lack of lubrication affected No. 2 turbine. Being at 7 o'clock, gravity would probably have allowed sufficient oil to flow to the bearing to provide adequate lubrication. This could not happen to No. 1 turbine where position at 5 o'clock.

► **Nurse Box Cocks**—American says it is experiencing trouble in the turbine's nurse boxes. The cure is currently engaged in a costly box reinforcement program initiated by Wright.

This consists of local strengthening, with doublers and gussets, of the interior of the exhaust nozzle with the nozzle box casting. American does not feel that the trouble is serious and believes that it will eventually be eliminated.

► **Patina Problems**—AA has experienced their compressor patina loss before. Wright has already made one improvement, insulating the patina from a faning rather than a cooling.

A later change will invert the pressure cell to pressure-regulate outlet rather than inlet air, which will relieve patina ring wear. These two fixes should fix the patina loss, faning problem.

► **Cool Power Swells**—On an aircraft base, American likes the Wright Turbo Compound engine. Its engineers point to the excellent power section of the R1350, which in its later models has given highly reliable performance in such places as the Lockheed Constellation and Super Constellation and the Navy P-3V patrol bomber.

The strain, which at this writing had accumulated a maximum of 55% in its inlet valve Turbo Compound, said American. Were that it had experienced no thermal covering problem with the powerplant. But the biggest of them all have to be dental effect, because the filters are too much and pick up "lots of small stuff."

The Civil Aeronautics Administration has approved a 1,800-hp overhaul period for the current, contingent on the condition of three variable engines inspected at the end of 500 and 950 hr of operation.

American's engineers look to the future of the Turbo Compound "with an eye of optimism." They are no reason why the commercial version of the powerplant cannot reach the 1,700 endurance, using currently approved for the military version of the engine.

► **Thrusting**—AA has experienced a few cases of premature termination of prop functioning spacer. This involves softening more serious than pushing the thrusting before again to further the prop completely. And the incident only

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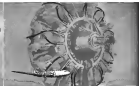
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operation at high altitude where outside temperatures are very low.

The modification has never interfered with an actual feathering operation, AA reports. Hercules 3500s have come up with a fix which should prevent future possible feathering breakdowns.

## Instruments

AA spokesmen say they have experienced several pressure problems at Eclipse Pioneer aircraft because some of the money they lent went to pilot's and co-pilot's instruments not appearing because of shakedown, extreme protection, and the little airplane lifting because of the close face of the instrument. This problem can be fixed, AA believes, by altering protection techniques. The carrier claims that the basic design is "very good," and says it has taken steps to prevent recurrence of the trouble.

► **Autopilot Message—American** will install the Sperry A-12 automatic pilot in its first seven long-range DC-7s. Further installation will depend to a considerable extent on how these first seven work out. The airline will weigh utility of the unit against any problems it can pose.

Asked why the autopilot was not installed by Douglas when the planes were delivered, AA made this point: Message of a positive autopilot such as the A-12 to a high performance plane such as the DC-7 is a very complex affair which cannot be accomplished with a simple wiring.

The DC-7 was constructed in such a relatively short time that the solution to autopilot installation problems lagged behind. But AA says the final solution is in the near future. The autopilot will be equipped with automatic approach complex to simplify instrument approaches.

The carrier does not see that the automatic approach complex will have operational loads until some time in the future.

► **No Vacuum—A** major policy change enacted when American bought its DC-7s was the elimination of the vacuum system. All gyro instruments are electrically driven.

Here is how the carrier found adequate standby sources of a.c. power for its instruments. Clock, compass, indicator, etc. is supplied by two inverters, either of which can supply sufficient power for all the DC-7's a.c. The plane's a.c. needs are only 75% of other inverter's maximum output.

In case of failure of both inverters, the flight engineer can switch on a battery-powered inverter. Since the battery is normally connected to the main bus, the inverter is actually bypassed.

If the inverter breaks down, the crew

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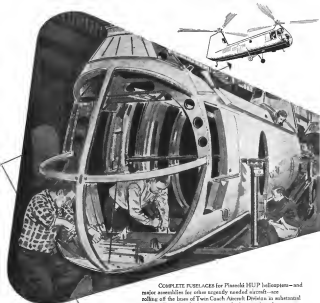
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6-6001



Jackie Jones (above) has been awarded and won his first flight in the V-12 while still attending Buick's Technical High School. He has been in the aircraft industry continuously ever since.

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can mount to two Eclipse Power air-cooled, aluminum mounted on Nos. 1 and 3 engines. The 100 cc. units supply a.c. at the proper frequency for instrument operation with engine rpm ranging from 2,000 to 2,400. Air-cooling feature cuts off any clutch, crank, induction or loading condition of engine operation.

#### Equipment

The engine men up its limited equipment with the 1700 cc. cooling equipment to date this year. The men have tested out up to expectations. The cooling package produced is slightly above that anticipated.

► **Improvement Expected**—Considerable improvement from a weight standpoint is in the air. American now gets five tons of cooling for 485 lb. an equipment weight. By using new materials, it hopes to get the five tons for as little as 250 lb. And with the new cooling plant given on the horizon, it is possible that the units may get set as high as seven to nine tons for the 250 lb. in weight. So American is optimistic about the future of its automatic air conditioning system.

It is too early to evaluate the maintenance reliability of the Fron system.

► **Goodbye Bunkie-AA's DC-7s** are equipped with Goodbye triple-deck bunks, which have excellent heating qualities, according to the carrier.

It has experienced these minor troubles:

• The bunk's parts are protected against corrosion by being plated with cadmium and zinc. This material tends to melt off under the bunk's high operating temperatures. Result is that sodium metal tends to chip up inside elements, causing them to drag. Solution, according to AA, is to strip off the cadmium and use and get in a protective finish such as Permatrust.

• There has been a tendency for the bunk's aluminum back plate (stationary part of the bunk) to distort under load, preventing attachment bolts to loosen. America says Goodbye is going to a forged-steel back plate to increase its strength. Bolt nut is also being increased by one.

► **Electrical & Hydraulic**—The DC-7V electrical and hydraulic systems function well, according to engineers who specialize in these systems.

The planes' Valves fixed displacement hydraulic pumps have been changed from 25 deg. to 30 deg. to give greater capacity.

AA says "the hydraulic system of the DC-7 is basically the same as that on our DC-6s, -6Bs and -6Bs, because the high degree of reliability of the system is demonstrated in these planes did not indicate that any major changes were necessary." AA has selected AN hydraulic

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Speed & Range—To run an American's opinion of the DC-7, airline spokesmen say "In the DC-7, American Airlines has a player with the speed, range and high degree of comfort which will keep one active in the forefront of the business of air transportation until U. S. jets are proved and ready to carry the flying public."

## Swiss Introduce New Plane Instruments

A new line of Swiss aircraft instruments, designed for wide applications in military, executive, private flying and gliding fields, has been introduced in the United States.

Manufactured by Perini Instruments, Inc., the line includes pressure barographs with altitude scales up to 55,000 ft., accelerometers, tachometers, tachographs, altimeters, aneroidographs, turn indicators and radio sounding balloons.

One operator, by use of a Perini Magnetograph, found that 30% of his plane's engine operating time was on the ground and under more stress conditions than in any other engine operation. A revised operating control procedure resulted in substantial reduction in mechanical malfunctions; the company reports. (The Magnetograph is an instrument, mounted in an engine nacelle, which records manifold pressure, rpm, and piston stroke in a function of



## Tape Navigation Aid

Newly developed plastic tape has been put to use in navigation charts by private pilots. It is used to enable either following of a desired course line, leaving clearly visible any deviation in air wind velocity, true heading, magnetic variation and the like. Notations on written on small pieces of the tape, then placed at appropriate points on map. Manufactured by Leach Tape Co., Inc., tape sticks without marring, can be applied and re-applied, and can be written on with any ballpoint instrument.



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from a 2 1/2 in. wide roll of magazine going through at 40 ft. of operation (Aviation Week, May 5, 1952, p. 56).

Person biographies included for the test work have been ordered by a leading aircraft manufacturing firm, while others have been used by gliding instructors, according to the Martin Equipment Corp., who are introducing the test line in the U. S.

British European Airways conducted a trial at past research project using Perma accessories, the firm adds. Models say that Perma research and engineering facilities are available for the development of special-purpose instruments. Models' address: 224 South Michigan Blvd., Chicago 4, Ill.

## OFF THE LINE

Dockers Aviation Corp. has expanded equipment overhaul facilities to include complete overhaul, modification and repair work of all light, navigation and engine instruments of Air Force B-47 and B-52 jet bombers. The company says it has all the laboratory facilities and trained technicians to provide this service as any instrument whether mechanical and pneumatic, electrical or electronic. The Dockers has been CAA-licensed for three instrument classifications. And the company has quality control approval from the USAF, USN and RCA.

Company test rig, being installed by Stratos Division of Fairchild Engine and Airplane Corp., will spin accessory subcomponent equipment at high Gs, since living loads imposed on such equipment when installed in fighters are increasing at high speeds. The machine, built by Crum Hydrostatics, will go into Stratos' Bay Shore, N. Y., plant.

American (Columbia National Airlines) has signed a contract with Lockheed Aircraft Service, Inc. (LMS), for all maintenance and other services on two DC-9 passenger planes scheduled for service on the carrier's Georgetown-Yad, via Tampa and final price per flight hour.

Truitt, Inc., Newark, N. J., has opened a Michigan office at Elm 841, Brook Hills, 12499 Westinghouse Blvd., Detroit 26. Its change is Edward Frank.

Oil filtration systems for aircraft engines delivering over 5,000 hp are under development by the Aviation Products Division of Walsworth Engineering Co. in cooperation with engineers of several major airlines, the company announces. Here it is to secure adequate filtration with out excessive weight or bulk penalties.

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Unit may also be used as a lead sorter. Gylograph separates iron and non-ferrous, thereby sorting off standard parts. It can also be used with a type 487 electronic refer unit.

Relay units eliminate operator disconnection and make it possible to sort many thousands of parts per day with satisfactory results. Parts can be passed through but end in a lock container or other last-handling means, it is noted.

Relay unit also reads out weight of, whenever off standard part passes through unit cell. Signal can be used to operate a solenoid operated reject gate or other reject means.

W. D. Co., 1 Eagle St., Eagle Wood, N. J.

### Hydraulic Press Reduces Both Tube Ends at Once

New double-end tube reducing by double press reduces both ends of a tube simultaneously.

To reduce 2 in. diameter, then welded, stainless steel tubing to 1½ in. at each end, two reductions are required in order to prevent buckling. Two-stage machine reportedly has solved problem using a piezoelectric reducer as well as a fluid reduction die.

Die is mounted vertically in stack along with internal workpiece. In double knockout at each end. As one return after reduction, knockout automatically rejects tube.

One cylinder block with its pumping

unit and controls can be moved along bed by motor-driven lead screw to accommodate tubes from 3 ft. to 12 ft. long in increments of 6 in. Keys serve the bed take the thrust load, tubes are automatically fed through machine.

Air-operated tube clamps are used for finger tubes, eliminating tendency to bow during reduction. Lubricant pump and vacuum unit at each end of press lubricate tube ends prior to reduction.

Manufacturer states that press is capable of producing at rate of 150 tubes per hour.

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## CAA Backs Avgas Tax to Support Airways

- Charge would cut 20% from airlines' net profits.
- Congress to use report in framing legislation.

By Richard Holzman

A revised airways user charge study calling for support of the \$67.5-million federal airways through imposition of an aviation gas "pollage" tax was sent to Congress last week by Civil Aeronautics Administration.

Because direct charges for use of specific airway facilities and services "do not appear to be administratively feasible and might well tend to lower the general level of safety," the study reveals that only indirect charges, such as the "pollage" tax would be practical.

As proposed in the current study, the charge would cut about 23% of domestic truck owners' annual net profits if the plan is approved by Congress and the President.

► **Ten-Mile Tax-A** second indirect charge would be a gross ton-mile tax applicable to all aircraft of more than 4,500 lb maximum gross takeoff weight and a graduated surcharge for air taxi use for flights for all planes weighing up to 4,500 lb.

However, the study finds the "pollage" charge preferable since it would involve less administration problems both to the government and users of the system and would find broader acceptance.

CAA's study was prepared by chief economist Richard K. Wildo and H. J. Gier, transportation economist, under the direction of Joseph D. Bhatt, assistant administrator for program coordination.

The study is the result of an earlier draft submitted to Civil Aeronautics Board, Defense, State and Treasury Departments and to nine transport agencies and associations directly affected by the proposed plan.

► **ATA Comment-**The earlier study aroused little response from Air Transport Association when released in October ( Aviation Week, Nov. 2, 1975 ). A TAA attached the basic summary and statistical methods and logic of the CAA report.

The association figures domestic scheduled airline carriers are responsible owners of about 512 million a year, instead of the more than 521 million proposed by CAA. Last week ATA also

**Airways Tax Revenues**  
Estimated receipts from charges to be imposed on domestic civil aviation gasoline in fiscal 1976

User group	Estimated gasoline consumption (billions of gallons)	Estimated receipts (\$000,000)	
		At 15 cents per gallon	At 25 cents per gallon
Scheduled air carrier	810	\$12,150	\$12,150
Other civil	110	1,650	1,650
<b>Total</b>	<b>1,810</b>	<b>\$13,800</b>	<b>\$13,800</b>

Estimated receipts from various gross ton-mile charges imposed on aircraft of more than 4,500 lb maximum gross takeoff weight

User group	Estimated gross ton-miles (billions)	Estimated receipts (\$000,000)	
		At \$100 toll per gross ton-mile	At \$1 toll per gross ton-mile
Scheduled air carrier	12,000	\$1,200	\$1,200
Other civil	1,200	120	120
<b>Total</b>	<b>13,200</b>	<b>\$1,320</b>	<b>\$1,320</b>

Estimated receipts from aircraft registration fees imposed on all aircraft up to 4,500 lb maximum gross takeoff weight

Weight category (lb)	Number of active aircraft	Annual fee per aircraft	Estimated total receipts (Actual)	Annual fee per aircraft	Estimated total receipts (Actual)
0-1,500	26,957	\$5.00	\$134,785	\$10	\$269,570
1,501-2,500	14,618	10.00	146,180	25	365,450
2,501-4,500	5,271	27.00	142,377	50	263,525
<b>Total</b>	<b>46,846</b>		<b>\$423,342</b>		<b>\$698,545</b>

Source: Department of Commerce

CAA was studying the revised user charge proposal, although feeling sure they would stand on their own merits.

► **Costs for Congress-**No specific concentrations are made in the entire 171-page study. It was submitted to Congress as an advisory report to be used "in framing and considering airways user charge legislation."

The study finds the "pollage" charge method of obtaining operating funds the most desirable method of obtaining a system for the federal government. "This approach has received considerable support in the past, both from the government and the industry and was based on CAA's 1945 report on multiple taxation, in the Board's 1944 report on an expansion and research, and in CAA's 1950 report on a user charge program."

► **Measure of Use-**Chief needs of the plan are its equity and administrative simplicity, the study reports. Assuming it does "the amount of fuel consumed in an aircraft is proportional to its weight, power and distance traveled

Thus, assuming that on some flights an aircraft is on a scheduled or preferred route of the federal airways, the amount of gasoline consumed would determine both the use made of those facilities and the benefits derived from them."

Commercial scheduled carriers that would take the heaviest burden of the charge, billions more of the federal airways system would not be included in the "pollage" charge, because such a tax would involve much a bookkeeping transaction.

Passed in fiscal 1955, CAA expects it would receive \$23,750,000 less than a year from scheduled carriers if a 24 cent-per-gallon charge were imposed. Other civil carriers would contribute \$4 million a year.

In 1957, scheduled airlines consumed approximately 551 million gallons of aviation gasoline. Transport carriers used 133 million gallons.

► **Adjustment Possible-**With the advent of jet transport on the federal airways, during the "pollage" charge could be adjusted to compensate for variation, the report says. Induction



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use that first model of jet transports will consume twice as much fuel per mile flown as comparable piston engine aircraft.

As to collection of the "inflations" charge, CAA suggests it be collected at the refinery level at the time of the sale of the fuel, keeping administration of the levy and expense of collection at a minimum.

For international airlines, a different charge per gallon would be required, the report says. However, it is suggested that no foreign carrier charge be made until after the domestic non-charge plan has been initiated.

A charge which was based on domestic aviation use would not seem likely to be equitably related to international aircraft charges and use because of the difference in the number of facilities provided per mile flown.

Alternative-B problems would be that a "inflation" charge should be levied on a uniform basis, because there is no way of determining at the station level whether the fuel is to be used on domestic or international flights.

The gross ton-mile charge and profit and aircraft registration fee are paid in similar increments to the aviation tax.

The ton-mile rate is seen as easy to calculate although complex to administer because of the involved processing of operations reports that would be necessary.

The registration fee idea similar to automobile registration now paid to states, would have no direct bearing on use of the aircraft, the report finds. Close administration of this method of tax charge would be its administrative feasibility, although it would not be as simple as the "pollage" charge.

It might conceivably pose burden some to smaller aircraft operators, be-

cause the fee would be paid in a lump sum, says the report.

For aircraft of more than 4,500 lb. gross takeoff weight, those types of charges are suggested:

- Revenue tax/levy
- Anytime landing
- Gate revenue

"Domestic civil aviation appears to have reached a level of economic maturity which will permit it to make a reasonable contribution toward meeting the annual costs of the federal aviation system," the study states.

It points out that "approximately 96% of domestic revenue has come from flows by industry since October 1973. The picture level at which new charges should be initiated should take full account of the past as well as the prospective earnings of the carrier, and Congress, in deciding upon the suitable level, should avoid charges that would place an undue financial burden upon the industry."

## Bricker Tightens CAB Grip on Airlines

Legislation giving Civil Aeronautics Board increased control over scheduled airlines by authorizing the Board to impose civil penalties for economic violations has been introduced by Sen. John Bricker, chairman of the Senate Commerce Committee.

The measure, backed by CAB, failed to pass the Senate two years ago after Sen. John Sparkman, then chairman of the Small Business Committee, decried it as an extremely restrictive piece of legislation. The bill, however, also would apply to scheduled air carriers.

Ray Charles Wilkerson, chairman of the House Commerce Committee, has introduced the bill in the House.

► **Violations**—CAA-CAB at present can take two actions with economic violations:

- Issue a cease-and-desist order or revoke operating authority.
- Initiate through a U.S. attorney civil action for an injunction in a federal court.

The Senate Commerce Committee, in approving the legislation in July 1972, commented:

"From a practical standpoint, injunction and revocation proceedings can only be used as a last resort in cases of knowing or willful violations, and the criminal actions are not appropriate except in the most flagrant and serious cases."

"The only other existing remedy for economic violations—cease-and-desist orders and injunctions—applies only against future conduct. Thus, an order to stop is a position at this time, by causing a little caution, to engage in illegal practices and to engage in subsequent conduct which is not subject to civil penalties."

► **Swift Action**—"This permits them to stop economic violations from continuing until they are corrected, and at the same time without undue danger of imposing monetary penalties."

"Availability of civil penalties would tend to focus the public eye on economic violations and, in the process, exert a strong deterrent to unlawful conduct."

"Experience has shown that swift and sure punishment is frequently more effective than heavier punishment in the long run. The new measure would permit the Board to act swiftly in dealing with such offenders."

## Modernize Airways For Future Lee

Continued modernization of the federal aviation system will be required if the airline industry is to meet the projected 40 million air travelers in 1980, Ford E. Lee, Civil Aeronautics Administration, predicts.

"We could not keep up with today's traffic if we had not begun to make a start at modernization of the system along the lines recommended jointly by industry and government through the Route Technical Commission for America," he told the Institute of the Aeronautical Sciences in New York.

► **Cost Factors**—"But improvement of the system cannot be achieved simply by having new devices on top of those which have come into use during the last 15 years." Lee says. "The much more difficult problem is the system which will be necessary to the system necessary to support the new devices and to support the new devices."

Lee points to the collection of 452

communication stations by "approximately 40" and expanding of the "more than 70,000 sq. ft. of airspace system by replacement of 'old, low frequency, low-power' equipment with VHF omnidirectional radio signals to more important areas including those CAAV's airspace study."

► **TVOR Stations**—Reduction of the communication system "needs equal or better overall service to meet the total message at less cost to the public," he says.

There are 375 TVOR stations commissioned and nearly 24,000 TVOR stations available. "It would be desirable to eliminate some of the old-line stations."

## State Tests TVOR As Airways Extension

Minnesota's Department of Aeronautics is considering installation of TVORs (low-power omnirangers) at principal state airports to supplement the federal service, according to Commissioner L. L. Schneider.

The Minnesota project is in line with a Commerce Department policy to test federal agencies of services that can be handled satisfactorily by local and state governments (AVIATION WEEK Aug. 18 p. 51).

An experimental TVOR, built and loaned by Raytheon Electronics Corp. (Meriden) is installed at the Austin (Minn.) Municipal Airport, a single-engine aerodrome.

Decision to test TVORs will be made "in part on the basis of the VHF omniranger," as a part of the "omni-range study" by the CAA, in part on the actual contribution of low-power radio equipment to the federal system, and in part on cost," Schneider says.

The question of "intrusion" by TVORs into air traffic routes by the omniranger or civil DME system is a matter military officials called Texas. So far as is known, the military has not proposed the termination of TVORs, although Texas does provide both DME and TVOR-type omnirangers to military units (AVIATION WEEK Dec. 7 p. 40).

The Austin TVOR, operating on a full-time basis at 168.3 mc., meets CAA accuracy requirements, Schneider reports. Minnesota has extended assistance to assist officials of other states and cities to visit the Austin installation and several have accepted, he says.

## Merger Put to Vote

Proposed merger of Pioneer and Continental Air Lines (Aviation Week Dec. 28 p. 17) will be put to vote Feb. 27 at a special meeting of PNL stockholders in Dallas. Continental shareholders will vote Feb. 28.

## Sen. Johnson Asks Denny:

## Does Politics Sway CAB Voting?

No, says Board member in Senate committee hearings, air transport policy is the only factor in decisions.

Concern over party-line voting in Civil Aeronautics Board decisions and possible influence on Board action by the Undersecretary of Commerce for Transportation is reflected in questions put to CAB member Harold Denny by Sen. Edwin Johnson, ranking Democrat on the Senate Commerce Committee.

Since the Dec. 3 decision in which Denny—along with the two CAB Democrats—voted against the Board's order to permit airlines to carry mail, all voting has followed party lines.

With the two Democrats dissenting, the regulations passed have revealed the opposing divisions of the Airline, a committee named Eastern-Western Trans World Airlines service to the West, and Western American Airlines short New York-Mexico City route.

Johnson specifically said the question was given to him in connection with Denny's Senate confirmation.

Johnson: "Has the record that not more than three members of the CAB shall be appointed from the same political party? What is the reason for that provision, in your opinion? Would you like to see introduced to permit to let political parties to power political control of the Board?"

Denny: "I am not in a position to say to keep the Board free from political control."

Denny: "The reason that three members be and are no more than three members of the same political party in that a bipartisan board is the serious approach to a nonpartisan board that can be achieved. This division holds to a minimum of political division, which should be reached whenever possible."

Johnson: "Do you think that if majority party members of the Board, whether they be Democrats or Republicans, should have 'strategic' conferences from time to time in order to get their signals from the Administration—do you think that there's party politics as before, then, as called upon in Board meetings to use their votes on important issues?"

Denny: "Majority and minority party members or any group of members of the Board should have 'strategic' conferences from time to time as they see fit. Once before the Board was not divided on party lines as to party politics. We are not divided on air transport policies."

"The record clearly shows that the most frequent division is on the question of the timing of spending of the people's money. The record also shows

space cases where there has been a division between the members of each political party represented on the Board."

Johnson: "To what extent does the Board, or individual members, consult with the Undersecretary of Commerce for Transportation or others before the Board?"

Denny: "The Board or individual members consult the Undersecretary of Commerce for Transportation or the Civil Aeronautics Administrator in cases where the regulations of the CAB are administered by the CAA, and when new regulations are proposed or changes are suggested out of a political nature."

Johnson: "In any system should the Board, or individual members, consult with the Undersecretary before the Board is making a decision that the Board must decide?"

Denny: "No."

Johnson: "Has the Undersecretary of Commerce for Transportation ever volunteered to assist you, or the Board, in reaching a determination on any problem?"

Denny: "The Undersecretary of the CAA Administrator has acted in my knowledge volunteered to assist me on the Board in reaching a determination of any problem. The CAA Administrator and his employees, all of whom come under the Undersecretary of Transportation, directly participate in general matters connected with the Board."

Johnson: "Based on your long experience in public life plus your experience in recent months as a member of the CAB, in your opinion would the system whereby the Board and the public interest be better protected, if regulations were on the basis of a single category of transportation instead of a so-called independent quasi-judicial system?"

Denny: "My firm belief is that the system whereby we have better and the public interest be better protected by an independent quasi-judicial board than by a single category of transportation of any other individual. The most important reason for this is the great value of the deliberative action and the sharing of opinions."

Johnson's last question referred to the possible reorganization of CAA as an independent commission and enlargement of CAA under an undersecretary for air services (AVIATION WEEK Feb. 15, p. 14).



NAL Copter Serves Miami Area

National Air Lines recently 555 seven-passenger rotor, one of three that operate low on water, lands at new heliport located adjacent to the Miami Beach municipal stadium. NAL recently received two-

passenger approved new Civil Aeronautics Board to operate in representative passenger rotor service. Operations began Feb. 3 with a 240-mph radius of Miami (Aviation Week Jan. 25 p. 85).

## LA Airport Fights For Expansion Funds

Los Angeles—Lack of funds has blocked the long-coveted expansion program of the International Airport here at a time when traffic is at a record peak, according to the Department of Airports.

The only method for completing the expansion will be through a bond issue, the department reports. Such a program, proposed for last November's election, failed to get the necessary two-thirds majority vote.

The city considered an attempt to obtain necessary funds through revenue bonds, but an existing coupon or bond issue program was not interested in bonds covering such costs, particularly in bonds covering maintenance of existing facilities.

Another attempt to obtain approval of voters will be made at next November's election.

**Record Gains.** During 1955 record gains of airport activity have been reported. An all-time high of 2.5 million passengers used International last year exceeding 1950 (over 1957) Dutch records.

• Aircraft handled rose from 49,000 last Feb. 1, 1955, higher than the previous year.

• Traffic added up to arrivals and departures of more than 10,000 aircraft, mail and private aircraft, up 37%.

• Arrivals gained 15% to 50 million in combined arrivals for International and San Francisco Valley Airport set a new high of 51,568,930, 17% greater in 1955.

• **Makefile Methods.** All of this activity makes the completion of future airport expansion a critical item.

• **Robert A. McMillan**, general manager of the airport department, "As we present expansion facilities, we must use the most modern method to deal with the heavy volume of passengers, staff and freight."

• "The city of Los Angeles is in constant battle to find its position in the competitive air of the world's centers, we need complete International Airport not be capable of handling three times the present volume of business."

• **Expansion Stage.** At present the city estimates only 500 acres of the 2,500 set aside for airport purposes. Under development, as funds become available is an extension of runways to accommodate all types of aircraft including transport up to the heaviest military jet bombers.

Final stage of the expansion calls for an additional runway system to parallel the present main runway. Similarly, the expansion of both already is indicated as present facilities are operating at near capacity, the department reports.

• **Airport Hired-Up** for immediate construction is the construction and operation of a hotel on the airport. The Board of Airport Commissioners has used similar proposals submitted from hotel operators and airport letting a contract within six weeks.

The hotel site covers approximately five acres. Construction will be at the expense of the hotel operator, who will have exclusive rights.

Proposals being considered were submitted by Louis R. Roman, of New York; William L. Tiley, Beverly Hills; Arthur H. Jones, Inc., a group of South California businessmen and builders; and Wagner Construction Co., Beverly Hills.

## PAL Paper Project Boosts S-55 Seating

Phoenix Air Lines has completed a paper project to increase seating capacity of its S-55 Lockheed from eight to 11 places. Reason that PAL feels it can squeeze in three additional seats is because average passenger weight in the Phoenix is about 145 lbs.

Severely at S-55 aircraft, say PAL, has not ordered the S-55 and describe the airline's interest in the project as "prudent inclusion."

The proposal includes two features: remove heater and direct seating two in VHF cabin and become receiver plus two four-place and one three-place high-density passenger seats. Safety equipment includes first aid kit and life vest.

Design changes would be limited to 20 lbs. Maximum gross load of 40 gal would give a 100-in. range with 12 gal left for 20 min reserve. With 11 passengers, weighing a total of 1,595 lbs., PAL estimates it will have a payload left over for passengers baggage in cargo.

• **Weight Factor.** The average weight of passengers in the Phoenix is about 145 lbs. PAL estimates it will have a payload left over for passengers baggage in cargo.

## Pilot Layoffs Jump To Peacetime Peak

Airline pilot layoffs have jumped sharply in the past six months with an estimated 1,000 pilots laid off in 1954, compared with the end of World War II.

Total layoffed since last August was 305, equal over 25 airlines that this was offset partially by rehiring at the end of the year.

• **Some Rehired.** Indications are that the number of layoffs might have been greater if some companies had not returned pilots in anticipation of increased summer schedules.

There are many reasons are given for the current layoffing:

- Transitioning of Korea airift
- Increasing seasonal fluctuations
- General layoffing of all airline industry

as a whole in order to get full utilization of crews.

• **Two to 256.** Number of pilots layoffed by any single airline ranges from two to 256. The largest was Northwest Airlines, laid the greatest number, followed closely by Northwest Orient Airlines, Flying Tiger Line, Slick Airways, Transcon Air Lines and United Air Lines.

United took some of the sting out of its layoffing program by taking on 75 of its pilots in flight engineers. Several others are following suit, and one is negotiating them with ground personnel.

## CAB Sets Causes In Three Crashes

Pilot misjudgment of accuracy of weather conditions caused two airline DC-3 crashes last year and probably contributed to the second that delivered a C-46, Civil Aeronautics Board reports.

The three crashes—an scheduled flight and two military charter flights—killed a total of 30 persons.

• **Blocked-Up Flights.** In the DC-1 disaster, Captain Mack-Miller crashed on his way to New York City from New York City on Feb. 5, 1955, "due to misjudgment of the aircraft's altitude."

One crashed a DC-3 Air Lines transport jet, directly into a seven-thousand-foot mountain, it crashed into at Marshall, Tex., Mar. 17, taking three crew members and 17 of the 18 passengers aboard.

The other USAF pilot was flying on instruments near the route of a Republic Airlines scheduled flight, but crashed before the scheduled transport, plunged into a 5,000-ft ridge southeast of Vail, Wash., Sept. 1 on visual contact. "Two crew persons died in the accident."

The Air Force pilot used visual flight from the crash area to McCord AFB, Wash., destination of the Republic DC-3, would not have been possible at that time.

• **Beats Long-CAB.** The third crash, of an Associated Air Transport C-46 west of Fish Hawk, Ala., Jan. 7, was caused by pilot error that plunged the transport into its 13,000-ft crash site. "The pilot lost control because of his view that looked down the slope of the mountain, CAB found."

But the Board rules the command to land and the command to climb along the C-46's route. "It seems likely that even this condition could have been three or in an increase of altitude of not more than 750 ft. These conditions as rendered in the flight instructor's report. (The Board C-46) by only a few seconds without difficulty. There was no report received from the flight for a higher altitude."

• **Findings.** One of the bases of its investigation, CAB hunches down these findings, in the three crashes:

• **Basic DC-3.** Possible cause of the accident was (1) the misjudgment of conditions in a seven-thousand-foot mountain in loss of effective control of the aircraft and (2) the failure of the captain to adhere to company directives requiring the standard of weather conditions which conditions could allow such action.

• **Accident DC-3.** Possible cause of this accident was the pilot's attempt to maintain flight under the provisions of visual flight rules during instrument conditions.

• **Accident C-46.** Possible cause of this accident was the pilot's misjudgment of the aircraft's altitude during instrument conditions.

## AA Attacks Eastern Action on Mexico

American Airlines charged last week that Eastern Air Lines' request for a new order forcing passengers of American's Mexico City-Mexico City route with Feb. 5 was "full of misapprehensions."

Civil Aeronautics Board the week previous had approved by a 3-2 vote resignation of American's service to Mexico City. American West Feb. 17, 1955, for the purpose of purchasing the cooperative purchase of U.S. Air service. "pending confirmation on a long-range basis of a certificate on the line between the U.S. and Mexico City."

CAB's action would put American in competition with Air France, which operates service to Mexico City from New York and Mexico City.

• **Maximum Protection.** Charged, Eastern immediately filed a new order with U.S. Coast of Appeals in the District of Columbia. Eastern's statement says it respects the Board's regulations when it says that where official order is being given, it is not possible to grant such an exemption.

Eastern attempts to stress the impression that the exemption gives American some permanent right without a hearing. "American will 'All that the exemption does is to permit the act up with there is a hearing on an application for a certificate of approval pending for the new order. American has had no application for such a certificate in file with the Board since April 1947."

American also released CAB member John Lee who, with member Joseph Adams had deserted from the majority.

decisions. The airline said, "It is a request for a change of competition (law) to control that principle of competition call for competing as a U.S. carrier an artificial restriction making its service 25% lower than a competitive service of another carrier."

Two days after Eastern filed its complaint, the American World Airlines also objected to CAB's American move.

## CAB ORDERS

(Jan. 1955)

### ORDERED:

Investigation of selected items for State Alaska submitted by Alaska Central Airlines, Elko Air Lines, Pan American World Airways, United Air Lines, Western Air Lines and West Coast Airlines. Pending such investigation, issuing and decision by CAB, reduced fares are suspended until Feb. 15.

• **Mexico Action.** To show cause why the Board should not be, determine and put into a new order of 31,257,000 annually as to and reasonable frequency rate of compensation to be paid the order. It is open, not to 45.55 cents per revenue mile of scheduled service.

### APPROVED:

Phoenix Air Lines request to leave Mexico

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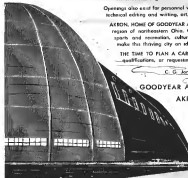
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## SHORTLINES

► **Air France**, independent French airline, has joined International Air Transport Assn., increasing IATA membership to 70 countries.

► **American Transport Assn.**, reports 18 of its 40 member airlines had no orders involving passenger fatalities in 1973. Two crash deaths during the year, both involving military personnel, total 24 persons.

► **Air France** has concluded a reciprocal sales agreement with **Carair Austral**, whereby Carair flights in Australia, New Guinea City and Miami will work with Air France flights in Mexico City and Miami for mutual sales benefits.

► **Allegany Airlines** has applied to Civil Aeronautics Board for permission to extend its Pittsburgh-Philadelphia route to New York-Newark via Toronto, N.J.

► **American Airlines** has granted pay increases ranging from \$1.00 to \$34.67 a month for 5,500 ground employees—the second general wage boost in an and a half months.

► **British Overseas Airways Corp.**, is offering a group of 10 amphibiplanes Caribbean as bonus in conjunction with its subsidiary, British West Indies Airways. Most are first-class.

► **California Eastern Airways** has been awarded a two-month contract by USAF for service in the trans-Pacific shift between California and Tokyo with four DC-8s.

► **Capital Airlines** has reorganized operations through service from Milwaukee and Minneapolis-St. Paul to Miami under a franchise agreement with National Airlines.

► **Houston** and **Trans-Pacific Airlines** had their biggest year in 1973, carrying a combined total of more than 95,000 passengers.

► **International Civil Aviation Organization** announces that on Feb. 13 Uruguay will become ICAGO's 49th member nation.

► **Lake Central Airlines** has moved its Chicago offices into the new terminal at Midway Airport.

► **National Airlines** set a new record for passenger travel over its 33-city system in 1973, with overall traffic up 36% over 1972.

► **North Central Airlines** carried a re-

## Air-Sea Travel

Scandinavian Airlines System is seeking new air routes to Africa, particularly passengers to travel easily by plane and the other by ocean liner.

Under an agreement with Farin Line, SAS provides a connecting document on the coordination tickets and allows passengers to ship over in Europe en route to their destination.

and 277,663 revenue passengers in its system in 1973.

► **Pan American World Airways** will designate direct service from U.S. to Denmark, Norway, Sweden and Finland Aug. 25. PAA is starting up service for interconnection of board lists to all points on its Pacific routes, with action expected by Fall 1974.

► **Pioneer Air Lines** released an average of 42.67% occupancy on all flights in 1973, compared with 41.42% last year in 1972.

► **Port of Oakland, Calif.**, has granted United Air Lines a one-year lease on a total of 7,332 sq. ft. of space at Oakland Municipal Airport for the establishment of an expanded OAL freight terminal.

► **Scandinavian Airlines System** has opened a district sales office in Montreal.

► **Seaboard & Western Airlines** reports that material and military operations on Atlantic and Pacific runs in November increased 63% over the same month for 1972, a total of 943,074 revenue flight miles logged in 4,385 hr.

► **Trans World Airlines** reports domestic passenger mileage over its domestic routes during the first 12 days of January increased 31.7% over the same period of 1973.

► **United Air Lines** set a company record for passenger traffic in December, operating 21,195,000 revenue passenger miles for a 19% increase over December 1972. The carrier has added CAR service to integrate seven Los Angeles cities—Wadsworth, Mission City, Ft. Dodge, Sioux City, Des Moines, Clinton and Rockford—with its continuous network.

► **Vickers-Armstrongs Aircraft Division** of Wayland will open an office in Montreal to meet Trans-Canada Air Lines in the carrier's transition to turbo prop Vickers.

## AVIATION CALENDAR

Feb. 12-13—American Institute of Electrical Engineers, winter capacitor conference, Ambassador Hotel, Los Angeles

Feb. 12-13—Montana Aviation Trade Assn., convention, Bozeman

Feb. 15—American Society for Testing Materials and National Association of Chemical Engineers, joint meeting, Dallas

Feb. 18-19—Institute of Radio Engineers and American Institute of Electrical Engineers, winter county conference, Philadelphia

Feb. 21-23—Third annual Texas Agricultural Aviation Conference, Texas A&M Co. College Station, Tex.

Feb. 21-23—Seventh annual National Model House Exhibit Contest, sponsored by Air Force and Cleveland Chapter of Engineers, Hyatt Co. Anderson, Cleveland

Feb. 24-26—Ohio Inland Agricultural Aviation Conference, Ohio State University

Mar. 8-10—Institute of Radio Engineers, national convention, Mayflower Hotel, Washington, D.C.

Mar. 18-19—Institute of Radio Engineers, national convention, Waldorf Astoria Hotel and Rappahannock, New York

Apr. 5-6—Society of the Plastics Industry Chemical, Inc., 10th annual conference, Mount Royal Hotel, Montreal

Apr. 5-8—National Management Assn., 21st National Packaging Conference, Cambridge Hotel, Atlanta City, Ga.

Apr. 16—National Advisory Committee for Aeronautics, convention on helicopter research for American Helicopter Society, Langley Field, Va.

Apr. 16-18—Society for Experimental Stress Analysis, spring meeting, Netherlands

Apr. 18-19—Symposium on automatic production of electronic equipment, sponsored jointly by Stanford Research Institute and ORAC, Forrester Hotel, San Francisco

Apr. 21-24—Second annual student paper competition and award, sponsored by the Society of MAS, Madison Hotel, Dallas

Apr. 25-28—Joint meeting of Radio Tech. and Conference for Aeronautics, Plank Institute Laboratories, Philadelphia

Apr. 21-23—American Institute of Electrical Engineers, symposium on feedback control, George Hotel, Atlantic City, N.J.

Apr. 25-28—American Society of Test Engineers, winter capacitor conference, Ambassador Hotel, Los Angeles

Apr. 25-28—Montana Aviation Trade Assn., convention, Bozeman

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## Airlines &amp; Youth

For years I have been an active reader of Aviation Week, and find it to be the best publication for all phases of aviation in the world.

I have been active in all phases of aviation for 19 years, having had to make my own way up the ladder to the point that I have such CAA certificates as Aircraft Engineer, Machine Engineer, and Flight Engineer Rating, as well as FCC Radioteletype Radio Phone License 1st Class, but having had to do this by way of civilian methods. I was unable to be accepted by the Air Force and consequently had no CE 300 to offer and to become an education for any future that I had.

I am writing you to find out why the airman wants to follow a program of being and maintaining his young men, such as United Air Lines, the flight engineer trainees, ages 21-30 next, in American Airlines, 20-31, and others, with completion of TW-6, and others, of age 21-27 for flight engineer 21-31 for captain.

It seems to be that certain companies want have told these aviation companies that the idea that it is a lot longer until they get their 18 or 19, get a man that is, but at best 35 years he has flight experience enough to earn quality for a good flight engineer.

It is known that I have 2,000 hr. as flight engineer, but can't be accepted by various airlines because I either can't pass an airline examination (such as TW-6), has with college subjects that have no bearing on flying (Geography) or because they want less 22.5 hours (in United).

The result is that I'm forced to take secondary positions in airports where I'm sure this qualified for higher technical flight position. The age limit defines me, I, as well as possible others who have had to pass certificate that had very, diverse a mere consideration that this allows them to make it go.

The use of the index quoted valuable time they would use them down due to age, or make them go back to work in accordance to work "up" as flight engineer, but consider the fact that CAA has given them enough examination to sustain the use of the index in the category they are experienced in.

B. S.  
Pasadena, Calif.

## Side-by-Side Again

I was extremely interested in your article on page 42 of Aviation Week, Nov. 30, 1964, in which you wrote concerning Mr. Daubert's views on the side-by-side engine layout ("Who's Reminded Side-by-Side Again?").

You will, of course, know that the RAF Preston also wrote some letter was designated to a specification dated 1945 and the side-by-side arrangement was decided upon by the staff and members of the King's College Flying School which, at that time, included representatives of all the Com-

mmercial Air Forces and, indeed, it is most probable that others of your firms were attending the meeting.

There were in the RAF a quite considerable body of supporters to the side-by-side layout, mainly, possibly the aircraft, but as the aircraft came into full use in the Flying Training Schools the practical advantages became so apparent that even the most ardent opponents were silenced. But that the war did not stop specification for the RAF in 1945 perhaps also the side-by-side scheme and perhaps the Preston seems to have set the rest of our Air Staff's approval on the line.

This seems that, as far as the RAF is concerned, all points are now treated in "single" mode, as in side-by-side trainers, i.e. the President and the Vampire.

In the last paragraph but one of your article you say that there are many arguments against side-by-side engines, and the remark has caused me curiosity. From my knowledge of Aviation Week I feel certain that it has not been concerned by me to consider the feasibility of the issue between of independent trainers. It would be very surprising to have the arguments of those who oppose Mr. Daubert's views but they would not appear to be of much value when they were backed by practical in structural experience of both arrangements. Of course, many many of the structural arguments, but I also know that practical experience has failed to bear them out. If you can find space to present the arguments to me I feel that I can not only be read with great interest but also of your reader including myself.

A. N. Kowetzky,  
10 West Compton  
Hawthorne, Ill.  
England

## 'Ideal' Business Plane

I have missed your article relative to market research concerning a business plane in the Jan. 1964 issue, as well as other articles appearing in Aviation Week from time to time on this subject.

As a small business pilot owner, I would like to call your attention to the fact that most of your thinking seems to be in terms of what Constant Electric or Alfa Romeo or other such industrial giant would find a landing in the way of a business plane. The very large and wealthy companies are naturally interested in a number of large planes.

I think that you have lost sight of the fact that there are far more mechanized and small companies who are now using single-engine planes that would prefer two-engine planes and more money, more money companies who have no planes at all who would be prepared for a very efficient, safe, two-engine airplane.

As to the third plane would be a four-place arrangement two-engine, capable of flight as either engine, 180 mph plus one and speed of the landings, over 50 mph (actual glide speed), with dual instruments, box and stable trim characteristics, and

even important, a price tag of around \$25,000 to \$30,000.

Of the two two-engine airplanes either as production or shortly to be in production, none of these cover all of these requirements. If and when someone develops such an airplane, it seems certain to meet with tremendous acceptance.

J. E. Perkinson, Jr.,  
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351 Cleveland  
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## 'Constant Speed'

I think the name "constant speed" goes to the Deane name in your Dec. 26 article (p. 33) concerning constant speed. The published name "constant speed" giving it the name is like giving the name "constant-speed" to a fast-food spaghetti when, say, it is prepared by a dynamically damped engine. In other words, "constant speed" usually implies providing action due to pitch change.

Mr. Constant and I are developing a basic idea constant speed name in which the hub has built-in automatic corrective pitch action. This feature is achieved very simply by applying the conventional blade-rotor bell bearings with special non-linear springs which are capable of converting part of the blade constraint forces into pitch-changing moments. The degree of such moment depends upon whether the airspeed forces rising in a greater or less than some predetermined design value.

A manual lock-in is necessary for crosswind hold. When this is satisfied automatically the moment increases pitch when the throttle is increased or when gusts are high, and vice versa, and also no loads pitch quickly after engine failure.

My plan is to construct a pitch order in a series of increments in the order of one or two degrees in the blade movement, and if a modification of the controls, I think can be of aid in your case, as before that not being, using Mr. Schuch's words in this article, "blades in contemporary design."

WILLIAM H. BAUER, Jr.,  
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100 N. Broadway  
Rochester, N. Y.

## Praise

Indeed you will find the information you requested for your Mar. 15 issue of Aviation. We are greatly appreciative having included in this widely read issue of what we consider one of the world's most accurate and popular aviation magazines. We are most pleased with the coverage you gave us in your Jan. 12 issue. We are indeed a great impression struggling to advance ourselves in the aviation industry, and when you come through as you have we appreciate it very much.

WILLIAM F. CHAM, President  
Bar-Cut Aircrafts Inc.  
1014 Main St.  
San Diego 9, Calif.

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## They're flying on top of the world

Allison's service representative on assignment with the 318th Fighter-Interceptor Squadron at Thule Air Base didn't know he was writing an advertisement when he sent the following report—but we think you'll be interested in these comments from northern Greenland:

*"I am sending a few pictures taken at Thule shortly before old Sol set for its last time here in the Arctic. I am sure that these pictures will be of interest—with a caption indicating satisfactory performance of the Allison J33 engine even in these adverse conditions, some 800 miles from the geographic North Pole, and almost due east of the magnetic pole."*

*"The Air Echelon overseas movement of the 318th with Lockheed F-94B's was made from McChord Air Force Base, Washington to Thule. This move, made without incident, indicates not*

*only the pilots' capabilities and outstanding maintenance of equipment, but also the rugged dependability of the J33 engine. During the first four months of operation here, even with the onset of the Arctic night and extreme temperatures, this squadron is still logging hundreds of hours of combat-ready flight a month.*

*"I believe it would be quite fitting for Allison to indicate its appreciation of the Squadron's unrelenting confidence in the J33 engine and its prolonged effort toward making jet fighter operations both possible and practical in the far northern reaches of the globe."*

Allison greatly appreciates this opportunity to salute the 318th Squadron of the Northeast Air Command for its splendid record in maintaining vigilant guard at the top of the world.



# Allison

DIVISION OF GENERAL MOTORS. INDIANAPOLIS, INDIANA



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